REPORT

OF THE

SURVEY OF THE NORTH SASKATCHEWAN RIVER FROM EDMONTON TO LAKE WINNIPEG

1910 -- 15

BY

L. R. VOLIGNY, C.E.

VOLUME 1 OF 3

Original. Copy

R E P O R T

OF THE

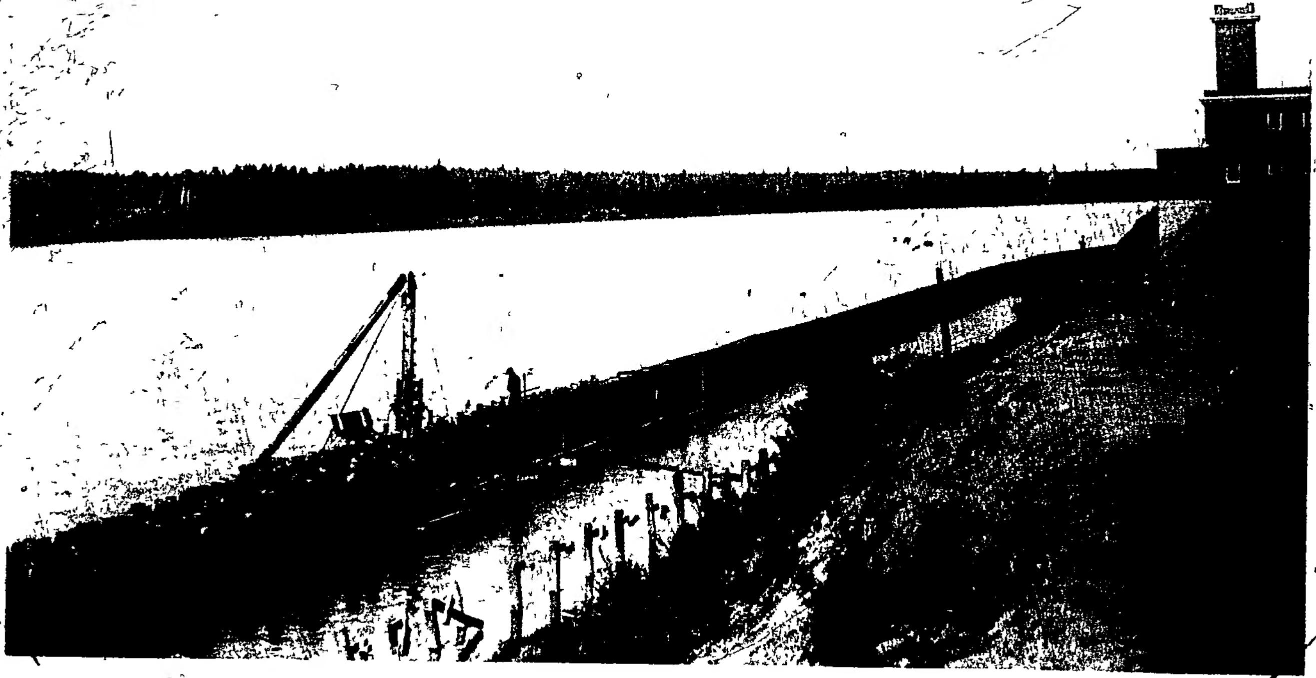
SURVEY OF THE NORTH SASKATCHEWAN RIVER

FROM

EDMONTON TO LAKE WINNIPEG.

1910-1915.

L. R. Voligny, C.E.
Engineer in Charge.



North Saskatchewan River at Prince Albert. Bank Protection Works-1914.

CONTENTS

C O N T E N T S.

SASKATCHEWAN RIVER AND BASIN

IMPROVEMENTS AND ESTIMATES

LIST OF PLATES

LIST OF PHOTOGRAPHS.

Department of Public Works, Canada,

DISTRICT ENGINEER'S OFFICE,

Prince Albert, Sask, November 26th 1917.

Eugene D. Lafleur, Esq.,

Chief Engineer,

Department of Public Works,

Ottawa, Ont.

Sir:

I have the honour to transmit herewith a Report of the Survey of the North Saskatchewan River executed under my charge, in accordance with instructions dated May 28th, 1910.

The purpose of the Survey was to ascertain the feasibility and cost of providing a navigable waterway for light draught vessels from Edmonton to Lake Winnipeg.

To carry on this investigation, a staff of Engineers and Assistants was employed in the field during the summer months, from June 1910 to October 1915.

The Charts, Plans, Diagrams, Tables, etc., accompanying the Report will readily show the information and data on which the results of the Survey are based. These results may be summarized in the following:

(1) It is feasible to create a navigable waterway for light draught vessels from Edmonton to Lake Winnipeg;

(2) Such an undertaking would necessitate improvements covering 941 Miles of River, at an estimated cost of $20,765,591.00

(3) A channel 150 feet wide and 6 feet deep at low water will meet the requirements of present and prospective navigation between Edmonton and Le Pas;

(4) From Le Pas to Lake Winnipeg a channel of the same width but 10 feet deep will be necessary in order to insure safe navigation in that reach;

Department of Public Works, Canada,

DISTRICT ENGINEER'S OFFICE,

Prince Albert, Sask, 191

E.D.L.-Continued.

(5) The proposed improvements will consist of (a) the dredging of the river bed and the removal of boulders in the rapids at an Estimated cost of ... $4,839,597.00; (b) the building of Diversion and Bank Protection Works in the upper river, Estimated to cost ...... $1,360,674.00 and (c) the Construction of Locks, Dams, and Canals, the cost of which is estimated at $14,565,320.00

(6) It is estimated that the minimum development of effective Electrical Power possible at Sites between Prince Albert and Lake Winnipeg, where permanent structures are proposed, would total 30,300 Horse-Power.

(7) The control and regulation of excessive floods by means of storage reservoirs at headwaters of the Saskatchewan is essential to the success of this project. Any improvement scheme should not be considered unless the possibility of such regulation has been definitely established.

The Report is expected to convey a general idea of the conditions met with on the Saskatchewan River as ascertained from Actual Surveys, and will show the character, purpose, and cost of works required to render the River navigable at the low stage of water prevailing during the season of navigation, from May to November of each year. Program of Dredging, plans of structures, specifications, etc., etc., are not embodied in the Report, as it is thought the preparations of such details can be better attended to at a later date, when the carrying out of the project has been decided upon.

Respectfully submitted,

T. Tiolijny

Engineer in Charge.

SURVEYS.

S U R V E Y S.

A summary of Surveys performed and results secured each season by the parties engaged in the field, from the inception of the Survey in June 1910 to its completion in the fall of 1915, is given in the following:-

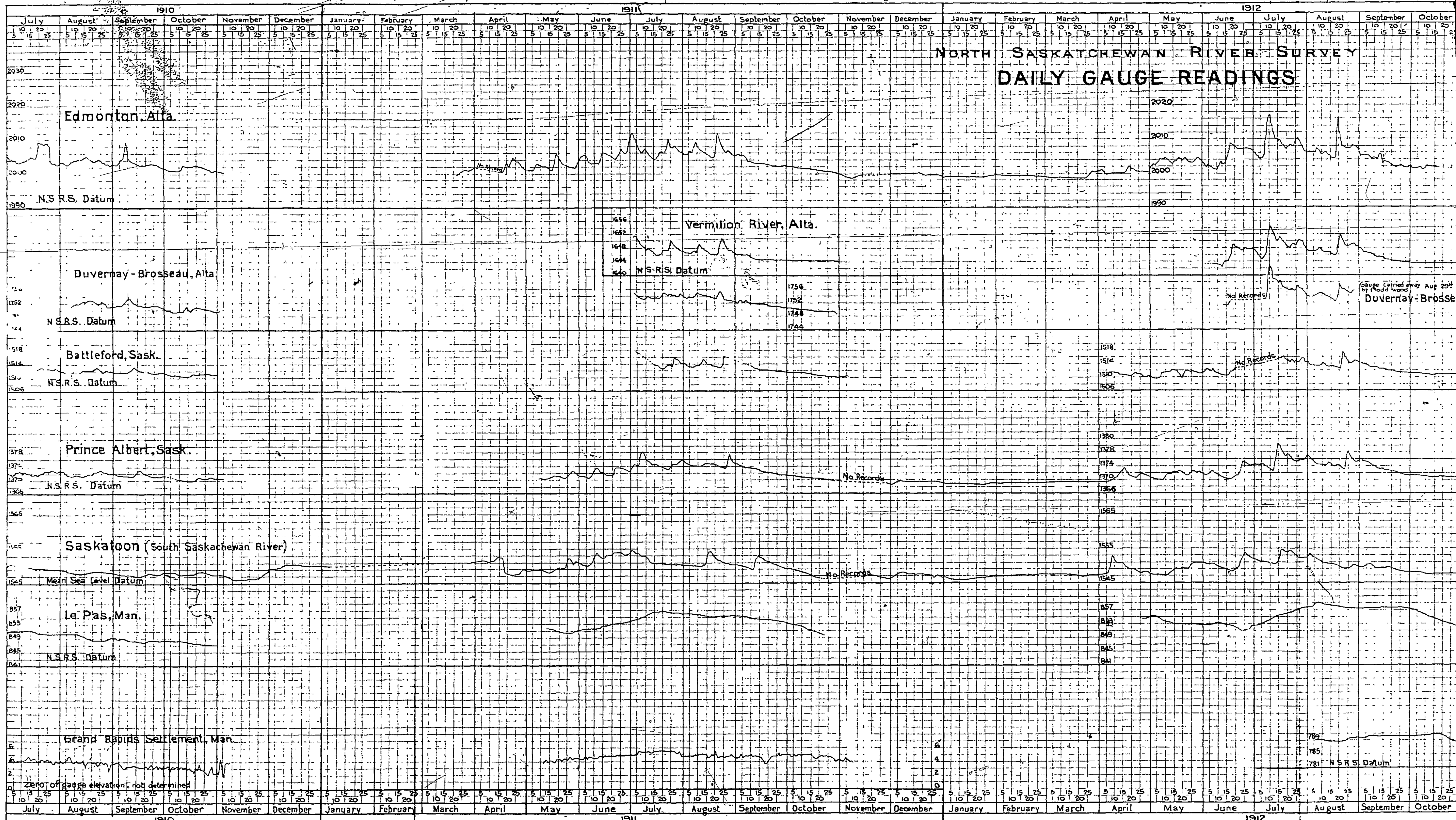
Season 1910.

Reconnaissance. A preliminary reconnaissance of the River from Edmonton to Le Pas, covering a distance of 801 miles, was made during the summer, the purpose being to obtain needed information as to the River grade and channel bed generally, and more particularly to ascertain the location, nature and extent of obstructions to navigation such as rapids, shoals, shifting sand bars, boulder reefs, driftwood piles, etc. Reaches in which these were such as to necessitate special works for their improvement were examined and noted for further detailed surveys.

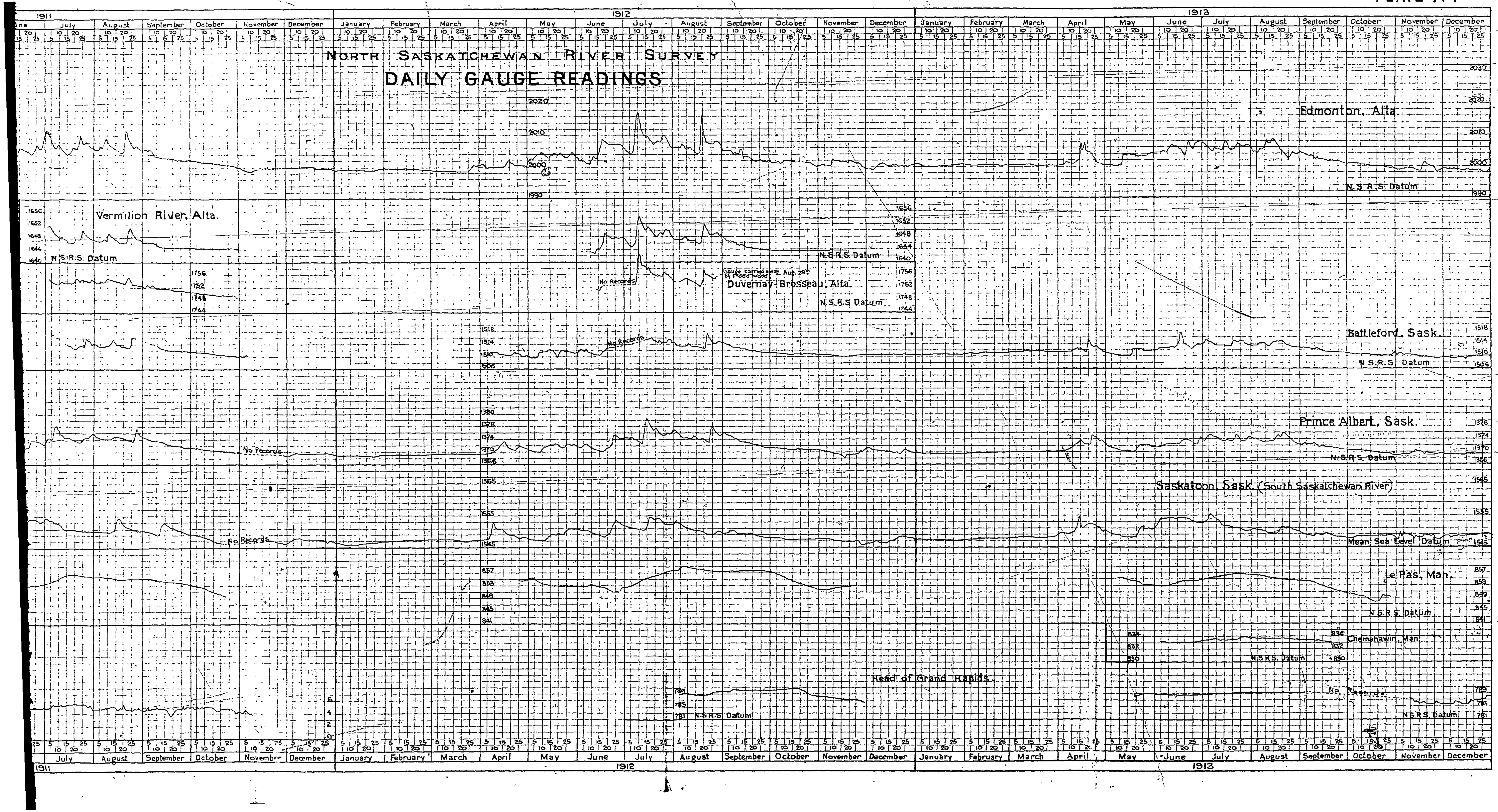
Launch. The small petroleum launch "Lafleur" built in Edmonton in the spring of 1910 for this survey, was used for reconnaissance work. It served also for visiting river parties in the early season, conducting the survey, distributing supplies and for the establishing of water gauges along the route. It was laid up at Edmonton in August upon the return trip from Le Pas, having been found unsuited for river survey purposes. Canoes were used to complete the reconnaissance and to attend to the survey the remainder of the season, or until October when all parties were called in.

Gauges. Nine water gauges were established at the following points along the River:-

LOCALITY	MILE	LOCALITY	MILE	LOCALITY	MILE
Edmonton	0	Duvernay	124	Hewitt's Ldg.	219
Battleford	328	Prince Albert	493	The Forks	531
Cumberland L.	726	Le Pas	801	Lake Winnipeg	941

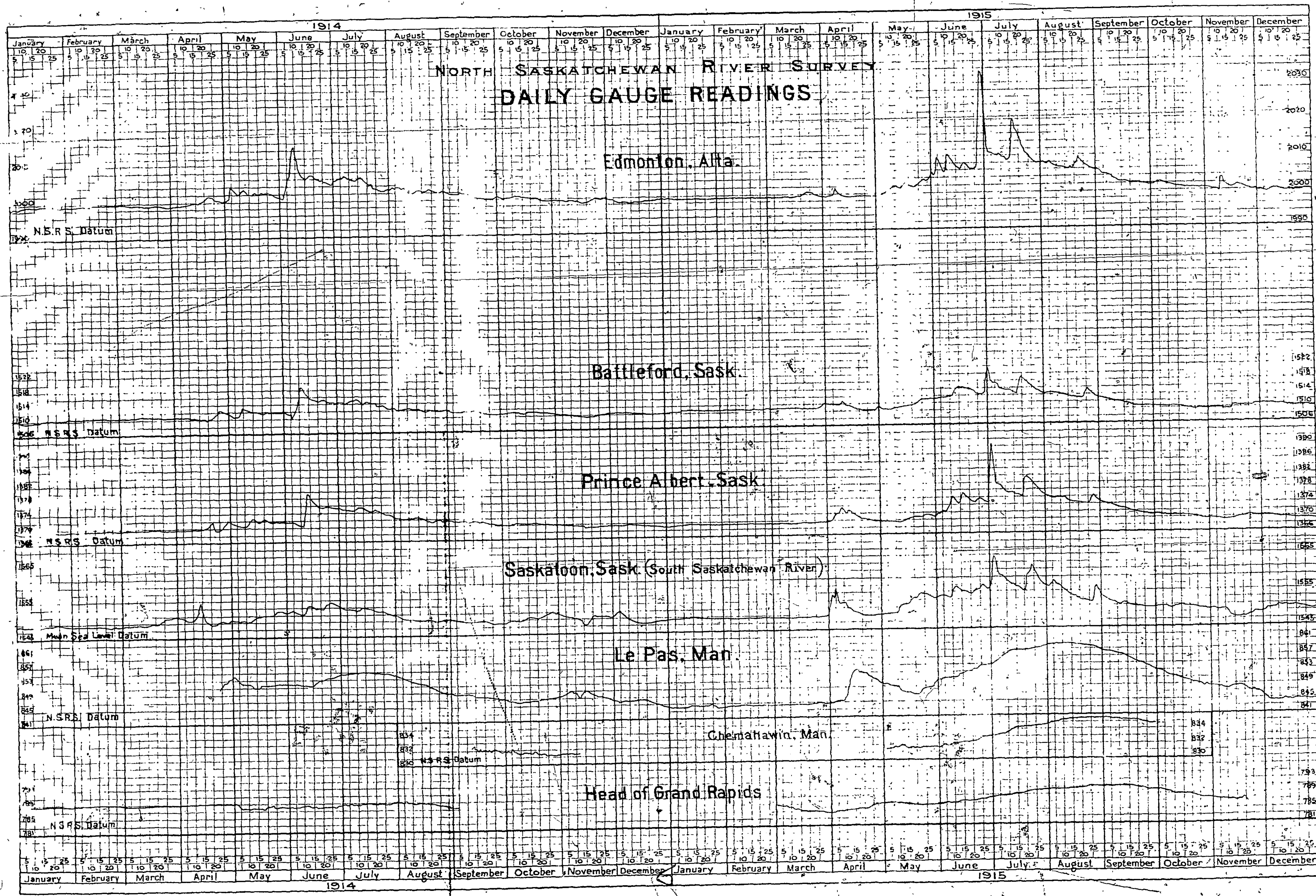


NORTH SASKATCHEWAN RIVER SURVEY
DAILY GAUGE READINGS
1910
1911
1912
July
August
September
October
November
December
January
February
March
April
May
June
Edmonton, Alta.
N.S.R.S. Datum
No Records
Vermilion River, Alta.
N.S.R.S. Datum
Duvernay-Brosseau, Alta.
N.S.R.S. Datum
No Records
Gauge carried away Aug 29th by flood wood
Battleford, Sask.
N.S.R.S. Datum
No Records
Prince Albert, Sask.
N.S.R.S. Datum
No Records
Saskatoon (South Saskatchewan River)
Mean Sea Level Datum
No Records
Le Pas, Man.
N.S.R.S. Datum
Grand Rapids Settlement, Man.
Zero of gauge elevation not determined
N.S.R.S. Datum



NORTH SASKATCHEWAN RIVER SURVEY
DAILY GAUGE READINGS
1911
1912
1913
Edmonton, Alta.
N.S.R.S. Datum
Vermilion River, Alta.
N.S.R.S. Datum
Duvernay-Brosseau, Alta.
N.S.R.S. Datum
No Records
Battleford, Sask.
N.S.R.S. Datum
Prince Albert, Sask.
N.S.R.S. Datum
Saskatoon, Sask. (South Saskatchewan River)
Mean Sea Level Datum
Le Pas, Man.
N.S.R.S. Datum
Chemahawin, Man.
N.S.R.S. Datum
Head of Grand Rapids.
N.S.R.S. Datum
No Records

PLATE A-2


NORTH SASKATCHEWAN RIVER SURVEY
DAILY GAUGE READINGS
1914
1915
Edmonton, Alta.
Battleford, Sask.
Prince Albert, Sask.
Saskatoon, Sask. (South Saskatchewan River)
Le Pas, Man.
Chemahawin, Man.
Head of Grand Rapids
N.S.R.S. Datum
Mean Sea Level Datum
January
February
March
April
May
June
July
August
September
October
November
December

Gauge readings were recorded at noon daily throughout the season of navigation, or from May to the freeze up in November.

Fluctuations of the River level at above named stations and at intermediate stations established in subsequent years during the progress of the Survey, are shown on Diagrams, Plates A-1, A-2.

Field parties. The organization and equipment of field parties was effected during the latter part of June at Prince Albert and Edmonton, these being the two main points from which the survey was conducted. The staff of Assistants, Rodmen, Chainmen, boatmen and labourers, numbering 50 men, was formed into 8 parties composed as follows:- Four levelling parties of 6 men, Two Transit parties of 8 men, One Contour party of 5 men and One Reconnaissance and supply party of 5 men (Launch "Lafleur").

Field parties were assigned to the several sections of river into which the Survey was divided and reached their destinations by canoe during the early part of July, from which time surveys were carried on continuously until the cessation of work on the 1st. of October.

Levelling. The distance between Edmonton and Le Pas (801 Miles) was divided into approximately equal sections among the four levelling parties, Section No. 1 extending from Edmonton to the Vermilion River at Lea Park (194¼ miles), Section No. 2 from Vermilion River to the Canadian Northern Railway Co's. bridge at The Elbow or Ceepee (198½ miles), Section No. 3 from Ceepee to the Head of the Cadotte Rapids (197¼ miles) and Section No. 4 from the Cadotte Rapids to Le Pas (210 miles).

Levellers were instructed to run two simultaneous or parallel lines and to set Bench Marks at intervals of 2 or 3 miles, care being taken to select points well above high water mark and at a safe distance from banks liable to

destruction by floods. The length of fore and back sights was limited to 400 feet. Measurement by pacing was adopted for equalizing sights, so far as possible. Reciprocal sights were employed in effecting crossings of the river, three or four pairs, being taken from each side with improvised targets.

The rods in common use were graduated to hundredths, and on sight of normal lengths were not read closer than the half-hundredths. Care had to be exercised not to read the rod too close to the ground when refraction was considerable, as in the early morning, or to attempt levelling under unfavourable atmospheric conditions. The instrument was screened from wind and sun by an umbrella to eliminate atmospheric errors.

Two Rodmen were used on each party. Each rodman carried 1" square iron pins, pointed at one end, 12 inches and 18 inches long, with axe and rod. The order of recording sights was, first B.S. on high pin, then both F.S., lastly B.S. on low pin, check H.I., advance. Owing to this method, it is seen that one of the axemen stationed near the Instrument with umbrella could, by carrying an extra set of pins, materially aid the progress of the party, receiving the pins from the rear Rodman and advancing them to the forward Rodman, usually during a "Set up", this rodman having already located and driven the set he carried. Thus the forward Rodman would not delay the advance of the party.

Temporary "Benches" were provided by cutting and trimming suitable trees such as poplars, spruce, large alders, frequently met with on the river banks, the stumps being protected by paint, and marked. Copper nails were driven in shelf hewn out for supporting rod at record Elevation, and a flag or painted cross-head, nailed to a nearby tree, to indicate the position of each Bench Mark.

These were numbered independently on each of the four sections and roughly located with reference to township and section corners, Islands, and other prominent features.

The limit of divergence allowed between duplicate lines was e = 0.02 distance in miles, equivalent to 0.035 ft. for benches about 3 miles apart. Where parallel lines agreed within this limit, the mean of both lines was adopted as the Elevation of the Bench; in cases where the limit was exceeded, the line was re-run from the last Bench. Connections made since the completion of this Survey with Precise Levels of the Topographical Surveys Branch of the Department of the Interior, at Edmonton, Battleford, Ceepee, Prince Albert and Le Pas, show that this limit of divergence was well maintained.

A total of 659¼ miles of duplicate levels were run in 1910 and 247 Bench Marks established on the main line of levels. The condition of each Section at the close of the seasons work is given in the table below.

Sect.	Reach	Lgth. (Miles)	Miles run	BMs.	Miles to complete.
1	Edmonton to Vermilion River	194¾	177½	48	17¼
2	Vermilion R. to The Elbow (Ceepee)	198½	136¾	48	61¾
3	The Elbow to Hd. of Cadotte Rap.	197¾	160¾	84	37
4	Cadotte Rapids to Le Pas	210	184¼	67	25¾
	Totals	801	659¼	247	141¾

The parties averaged 11 miles per week or about 2 miles per day for the entire season, which may be considered fair progress, in view of the broken nature of the Country along the River, and the delay due to the cutting out of lines, moving camps, etc. Owing to work being discontinued one month earlier than originally intended, the various sections could not be connected in 1910. The gaps, however, were closed the following year, a special levelling party having been detailed for the work.

Water levels. In addition to the reading of main gauges already referred to, water levels were taken at noon daily by each party opposite camp, and at the several Bench Marks, as they were being set up. Elevation of water at top and bottom of all rapids was also noted. From elevations thus obtained, a low water profile of the river was platted. See plate B.

Topography. Transit Party No. 1 started work 25 miles below Prince Albert, at the head of the series of rapids known as "La Colle Falls". A chain traverse of the reach, extending from the first rapid to "The Forks" - where both branches of the Saskatchewan River meet - was made, transit stations being connected, where possible, to section corner posts of Dominion Lands Surveys.

A detailed survey of the locality, with contours, was considered essential in view of probable works required to overcome the several rapids in this 13 mile reach. Work was completed in August, the party returning to Prince Albert, and afterwards proceeding up river, where it was engaged in locating Bench Marks, Ferry Crossings etc. as far as "The Elbow" until September, when it was called in and disbanded.

Transit Party No. 2 was detailed to survey the Cadotte, Nipawin, Tobin and Squaw Rapids. The Survey was divided into two sections: the first section 11 miles in length, comprising the Cadotte and Nipawin Rapids, the second section starting from the Head of the Tobin Rapids and extending 24 miles down to the Sturgeon River "Cut Off". Both sections, totalling 35 miles, were completed in 1910, excepting about ½ mile of river above the "Cut Off" which had to be abandoned owing to supplies being exhausted. The party proceeded down river from the "Cut Off", calling at Cumberland House for supplies, and reached Le Pas the second week in September, when it was paid off.

<u>Contours.</u> Upon completion of the traverse of the "La Colle Falls" reach by Transit Party No. 1, a party of 5 men with canoes left Prince Albert to contour both banks in the stretch of river surveyed. Contours at intervals of four feet were taken, beginning about 2 miles above the first rapid of the Series and ending at "The Forks", 15 miles below. The length of the several rapids and fall in each was ascertained, the low stage of the water being favourable for this work.

Owing to the lateness of the season, the contouring of the Cadotte, Nipawin, Tobin and Squaw Rapids surveyed by Transit Party No. 2, could not be undertaken in 1910. The party was therefore called in and paid off at Prince Albert on October 8th.

<u>"La Colle Falls".</u> The first serious obstacle to navigation in the Saskatchewan River below Prince Albert consists of a series of 14 short rapids having a total fall of 88 feet in 13 Miles of River. The fall in the rapids proper amounts to 50 feet, the remaining 38 feet being taken up in intervening "swifts". A list of these Rapids follows:-

No.	Name	Length	Fall	No.	Name	Length	Fall
1.	Peace Rapid	1/8 M.	1.5 Ft.	8.	No name	3/8 M.	2.3 Ft
2.	Big Stone "	¼ M.	3.7 "	9.	" "	¼ M.	4.1 "
3.	Squaw Rapid	¼ M.	1.4 "	10.	Horseshoe R.	3/8 M.	2.4 "
4.	Demicharge "	3/8 M.	3.4 "	11.	Stony Rapid	¼ M.	5.4 "
5.	No name	1/8 M.	1.0 "	12.	Crooked "	7/8 M.	7.5 "
6.	" "	1/8 M.	1.7 "	13.	No name	5/8 M.	4.8 "
7.	Steep Creek Rp.	5/8 M.	6.7 "	14.	" "	3/8 M.	3.9 "

The River bed here is considerably restricted, varying in width from 400 feet to 800 feet at low water. It is confined between steep clay and gravel banks rising in places 200 feet above river level. Low flat lands, with cut banks 10 to 20 feet high, extend a considerable distance back from

either side of the river, the opposite shore rising abruptly to prairie level.

A number of sharp turns or "bends" occur in this section. In several of these bends, large boulders, carried by moving ice from the higher reaches of the river, have accumulated, and cover practically the entire bed. Most of the rapids of the series are found in these bends.

The current in the "La Colle Falls" reach flows with an average speed of about 4 Miles an hour at low water, increasing at the crest of rapids to a maximum velocity of 8 to 10 Miles an hour, where steep pitches are encountered. Owing to these swift waters and the presence of boulders, many of which are barely submerged at ordinary level, navigation of this reach is most difficult, and hazardous at all times. It is practically impossible for Steamboats or large craft of any description to ascend the rapids, except at high water, and in order to do so they are compelled to "line" or "warp" over several steep pitches, a slow and wearisome process, even when winches or capstans are available. At low water row boats and canoes overcome these rapids by "tracking", and usually take two days time to cover the 13 mile stretch above The Forks.

The permanent improvement of this reach for navigation can only be accomplished by means of locks and dams. The first five rapids, - the Peace, Big Stone, Squaw, Demie Charge, and Rapids #5- will be rendered navigable upon the completion of the City of Prince Albert's Hydro-Electric Power Development works below the Demie Charge Rapids, work on which, however, was entirely suspended August 29th, 1913, and has not since been resumed. The remaining rapids of the series can be made navigable by the construction of a dam with canal and locks at The Forks.

Sketch plans of the City of Prince Albert's works mentioned above, and of proposed works at The Forks, are

shown on plates C-1 and C-2 attached and forming part of this report. (See pages 69 and 70).

Wing Dams, of cribwork and stone construction, rising from 4 to 5 feet above low water, have been suggested as a possible means of improving the La Colle Falls reach. It is doubtful whether their use would prove effective in maintaining the desired channel depth when low water stages obtain. As such dams must restrict the channel materially in order to raise the water surface, the velocity of the stream will of necessity be increased, thereby causing dangerous cross-currents and eddies near these structures; moreover as the dams will be submerged at high water, their presence will be a menance to navigation, being but a few feet below the surface, and invisible owing to the muddy waters when the river is in flood. Further, driftwood, of which an enormous quantity is carried down the river annually by the spring and summer freshets, being held by these dams as the water falls, will be liable to anchor and jam when released, and block the channel completely. In view of these objections, Wing Dams are not proposed in the above named reach.

<u>Cadotte Rapids.</u> The Cadotte Rapids are met with 98 miles below Prince Albert. The river at this point is from 1200 to 1400 feet wide, and falls 4.7 feet in about 7/8th. of a mile. One mile above the Rapid, cut banks of clay and sand, 60 feet in height, line the North shore. Further down the River, both banks become rugged and irregular, rising to a height of 130 feet at the foot of the Rapids.

No difficulty is experienced by large craft in navigating the Cadotte Rapids at high water, as during that period there is a depth of 16 to 18 feet of water in the channel. At low water, however, navigation is possible for small boats only, two feet being the average depth.

The removal of boulders and dredging of a channel

Sliding Banks, 200 Ft. High
Saskatchewan River
below Fort a la Corne, 1911.

Survey Cache near the entrance of the
Sipanok Channel, 1911.

8000 feet long through the boulder ridge will render the rapids navigable.

Nipawin Rapids. These rapids begin about 3 miles below the Cadotte Rapids and extend 3-1/8 miles down-stream, the fall in this distance being 15.3 feet.

The river, for two miles above, and one mile below, follows a sinuous course, making five sharp "bends", in which the swift waters are encountered. A good channel, from 6 to 8 feet deep at low water is found here, except in a few places where the depth varies from 2 to 4 feet only. Its general direction is parallel to the steep clay banks, from 175 to 200 feet high, which alternate on either side of the river at the several bends. A current running from 4 to 5 miles an hour at ordinary stages, increases to a velocity of over 8 miles an hour when the river is in flood. The range between high and low water in the Nipawin may be generally taken at 15 feet.

As in the case of the Cadotte Rapids, the Nipawin series offer no serious obstacle to navigation, the swift waters being the main difficulty to contend with. They can be made safely navigable at low water for craft of less than 5 feet draught, by dredging shallow spots and removing boulders where these have been deposited in the channel.

Tobin and Squaw Rapids. The Tobin Rapids occur 156¾ miles below Prince Albert, where the river broadens out into a shallow bed covered with large boulders, 2¼ miles long and from 1000 to 1800 feet wide. They are followed 1½ miles further down by the Squaw Rapids, the intervening stretch being deep and swift but free from boulders. There is very good water in the Squaw Rapids, of which there are two pitches, but a large number of heavy boulders make them difficult to navigate. These rapids are the last in the Saskatchewan River between Prince Albert and Le Pas.

The fall in the Tobin is 19.8 feet, whilst in the

Squaw Rapids, 1¼ miles long, there is a fall of 6.8 feet. For 3 miles below the Squaw Rapid, the river falls rapidly, the current running about 6 miles an hour. These rapid waters are called "Swifts", to distinguish them from the Rapids immediately above, i.e., where the pitches occur, although they may, properly speaking, be considered as part or continuation of the Rapids. The total fall from the head of the Tobin to the foot of these Swifts amounts to 45.7 feet in a distance of 8½ miles. Naturally, the improvement of the two Rapids should be considered together.

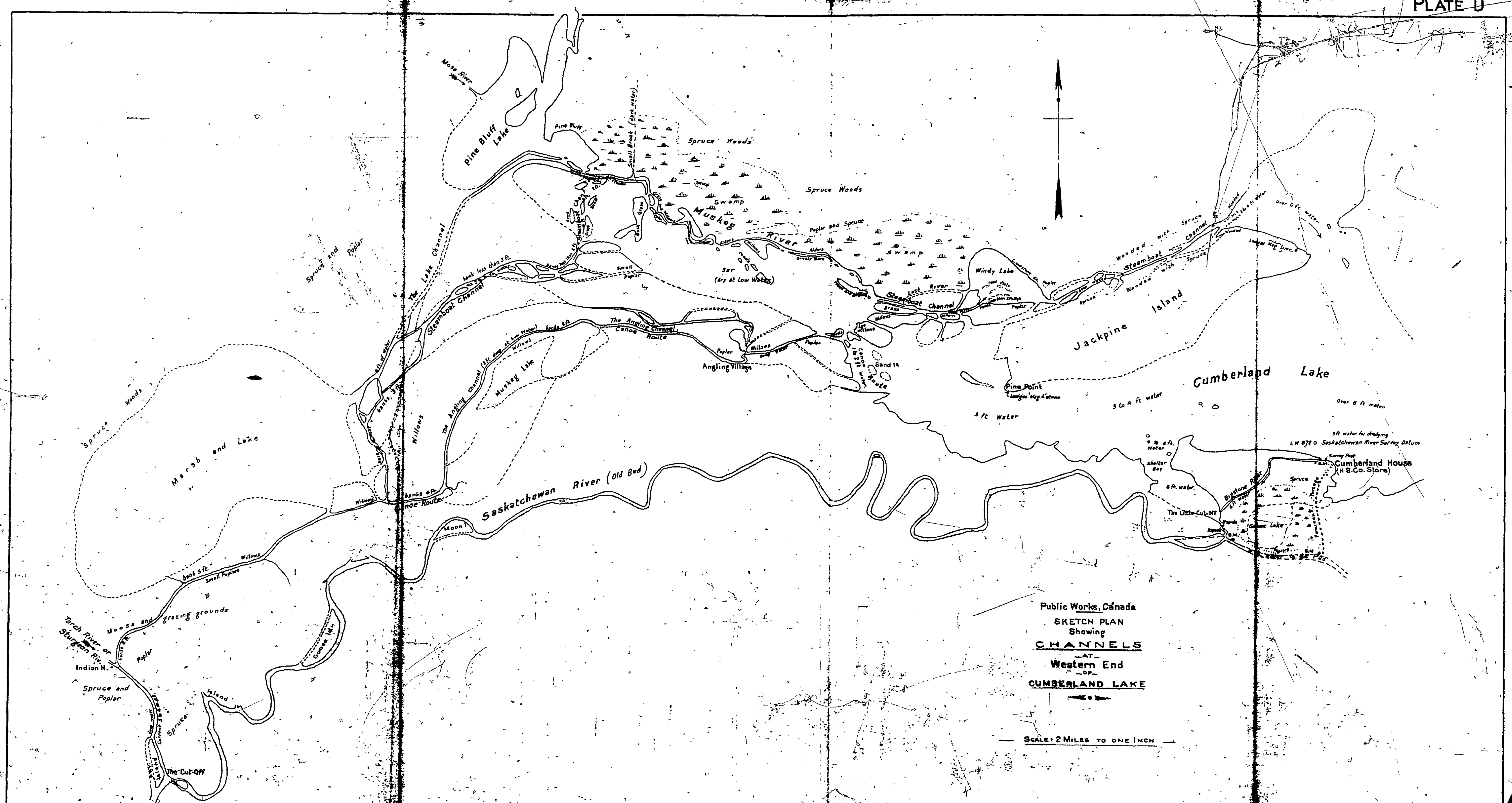
Navigation, when the river is low, is not possible in the Tobin Rapids, for boats of any description. For two miles above, the river is very shallow, there being less than 2 feet of water in places. An average depth of 2 feet is maintained in the Rapids. Boulders are so numerous that the river was crossed on foot by stepping from stone to stone in the late summer of 1911.

For the improvement of the Tobin and Squaw Rapids, a dam with three locks of even lift is proposed at the foot of the second pitch in the Squaw Rapids, as shown on sketch plan C-3 attached and forming part of this report.

With the contour information thus far secured, it may be stated that the water at this site can be raised some 68 feet without damaging an excessive amount of valuable timber, or flooding adjacent farm lands, the surrounding country being still unsettled. The new level established would render the river navigable as far as the Nipawin Rapids, or about 47 miles above the dam, thereby dispensing with a very large amount of dredging required in this reach, apart from providing considerable storage for power development purposes.

Sturgeon River "Cut Off". The Saskatchewan at Mosquito Point, 178 miles below Prince Albert, broke through its banks about 40 years ago when in flood, causing the main

PLATE D



Public Works, Canada

SKETCH PLAN
Showing
CHANNELS
AT
Western End
OF
CUMBERLAND LAKE

SCALE: 2 MILES TO ONE INCH

body of water to flow into Cumberland Lake by way of the Sturgeon or Torch River. Before discharging at the Western extremity of the Lake it divides into numerous small channels, of which the "Steamboat Channel", and the "Angling Channel", are the main routes followed in reaching Cumberland House, 55 miles below the Cut Off via the "Old" or Little Saskatchewan River. (See plate D.)

Owing to the reduced flow in the Little Saskatchewan due to new conditions created by this diversion, the river has silted rapidly and is now quite shallow, sand bars extending almost from shore to shore at several points. Navigation is not possible here at low water except for row boats or canoes. The channel however, is followed by steamboats and tugs at high water, when the increased flow provides sufficient depth for such boats.

The diversion of the main river into its former channel at the Cut Off, will be necessary in order to permanently improve this Section of River. **The type of** works intended for that purpose is shown on Plate "F". (See p.61)

The improved route via the Little Saskatchewan will always be possible for steamboats, whilst the present one, via the Sturgeon River, will eventually have to be abandoned owing to shallow water in Cumberland Lake, where the many channels enter. The Lake acts as a settling basin, in which an enormous amount of alluvial matter carried by the Saskatchewan is deposited. As a result of this process, the western end of Cumberland Lake is silting rapidly, and, in a number of years, will become too shallow for navigation of any kind.

It is expected that the proposed diversion works at the Cut Off will remedy this condition, and that, by increasing the flow in the "Old" channel, now shallow and constricted, a good channel will scour itself out in a few years, between the Cut Off and the mouth of the Big Stone River, 53 miles

below, without any considerable amount of dredging.

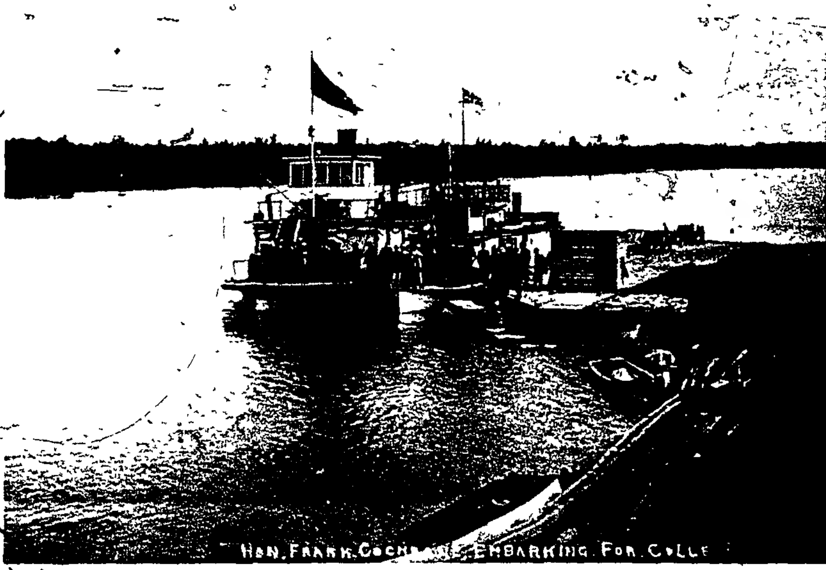
Saskatchewan below Big Stone River. The Big Stone river is one of the two main outlets of Cumberland Lake, joining the Saskatchewan where this river resumes its former character, i.e., at the end of the Little Saskatchewan River. From this point to Le Pas the Saskatchewan broadens considerably and is easily navigable at all stages.

The preliminary examination made in 1910, has disclosed the fact, since confirmed by soundings taken the following year, that a satisfactory channel, not less than 150 feet wide, and from one to two fathoms deep, extends all the way from the Big Stone outlet to Le Pas, and that consequently over this stretch of 70 Miles, no dredging whatever is necessary.

Office work. Upon the completion of field work in October, two Assistants were retained for office work, headquarters of the Survey being established at Edmonton shortly afterwards.

The checking of levels, calculating and adjustment of traverses for platting by latitudes and departures, etc., were attended to. Diagrams of temperatures and precipitations in the Mountain regions were prepared from information supplied by the Meteorological Stations at Banff and Edmonton. Water gaugings were platted and a preliminary profile of the water surface determined between Edmonton and Le Pas. Generally, the co-ordination and study of information collected in 1910 occupied the office staff during the winter months or until surveys were resumed in the spring of 1911.

Survey Boat "Lafleur" at Prince Albert, 1911.



Survey Boat and City of Prince Albert's Steamboat "George V" at Government Whf. Prince Albert, 1912.

Season 1911.

Organization. Three parties were put in the field in 1911:- A Transit and Sounding party of 20 men, a Levelling party of 6 men, and an Hydraulic or Metering party of 2 men. Extra men were hired for the last named party at metering stations. The new Survey boat, with a crew of 8 men, was also employed, making a total of 36 men engaged on the Survey.

The Staff of Assistants, Rodmen, Chainmen, Recorders, etc., numbering 13, were assigned to their respective parties upon reporting at Prince Albert and Edmonton during the latter part of May. The main party was outfitted at Prince Albert, whilst the Levelling and Metering parties made Edmonton their starting point.

Survey Boat. A new petroleum boat, the "Lafleur", especially designed for river Survey work, was built at Edmonton in the early spring, and commissioned in June, being later brought down river to Prince Albert, for service during the season.

The "Lafleur" is of the flat bottom, stern-wheeler type, 63 feet long, 14 feet beam and drawing less than 2 feet of water aft, when running. It is driven by one "Meitz & Weiss", 2 cylinder, 450 revolutions per minute, marine oil engine, (Diezel type) developing 30 horse power at normal speed. Transmission is by pinion and bevel gears to countershaft connected by chain to sprocket, reducing in that manner the revolutions of the paddle wheel to 36 per minute. The speed of the boat is about 10 miles an hour.

A small pile driver hammer can readily be mounted on deck for driving stakes or piles used for supporting water gauges.

Gauges. The New Survey boat was employed in setting up intermediate water gauges at the following points:-

Locality	Mile	Locality	Mile	Locality	Mile
Ft. Saskatchewan	25	Pakan	76	Desjarlais Ferry	103
Hopkin's Ferry	158¼	Vermilion River	194¾	Fort a la Corne	555½
Nipawin Rapids	595	The Cut Off	671	Pemmican Portage	725½

Gauges were also established at Rocky Mountain House, near the confluence of the Clearwater River with the Saskatchewan, and in the South Saskatchewan River at Saskatoon, for use in connection with discharge measurements of these rivers, on which work, the Hydraulic party was engaged.

A complete list of water gauges in use during the progress of the Survey from 1910 to 1915, is given in Table VIII, Appendix E.

Daily reading of gauges set the preceding season and of gauges at above points, were taken until November, when ice formed.

Driftwood and logs, carried by the summer flood, were responsible for the loss of several gauges in the upper river, shortly after they were put in position. They could not be replaced in 1911, the Survey boat being detained down river until October, when it was laid up for the winter at Prince Albert.

Traversing and Sounding. The Transit and Sounding party was engaged throughout the season on the Survey and Sounding of the reach from Prince Albert to Le Pas, 308 miles in length, the work lasting from June 1st to September 15th.

A stadia traverse was made of this reach, the method being considered sufficiently accurate to define the river course generally, and to locate sounding ranges, since connections or ties were possible at convenient intervals with existing Surveys of Dominion Lands. These were effected about every four or five miles, where section or township posts were accessible. Discrepancies in distances, due to stadia work, were adjusted by latitudes and departures, so as to conform to Township surveys, when notes were being

platted.

A detailed survey, with contours at 4 foot intervals of the Country, in the vicinity of the Sturgeon River "Cut Off" was also made. The Survey extends about 2 miles along the Saskatchewan, and a short distance only on the "Little Saskatchewan" and Sturgeon Rivers. It will afford the desired information for the study and design of proposed diversion works at that point.

Method employed. The method of cross reading from shore to shore, alternately between two transits, was made the basis of the stadia survey. Each transit swept only the opposite shore for traverse stations and location of range stakes. Magnetic readings of main courses were taken. With the checks thus obtained on both angles and distances, the maximum error of the Stadia work was found to be 1 in 200 and usually much less.

Wherever possible, transit stations were selected above ordinary high water so as to insure their permanence, and enable the Survey to be re-traced, if necessary. Stations were marked in the usual manner by hubs with copper or tinned nails driven in the centre; each was referenced by measurements to nearby trees and further marked with cross-head. Hubs were numbered to accord with stakes set for sounding ranges, not by the sum of the stadia courses, as usually done.

Soundings were taken about 50 feet apart, on parallel ranges 500 feet distant perpendicular to the current. In places where this was not possible, as in Rapids or where the river was both wide and swift, soundings were taken on "diagonal ranges" or lines traced by the sounding boat when landing and starting from the same point, to land again on the opposite shore further down stream. This method may not be commended, but combined with the use of a prismatic

compass, it can be successfully employed for sounding considerable stretches of river accurately surveyed but otherwise not staked.

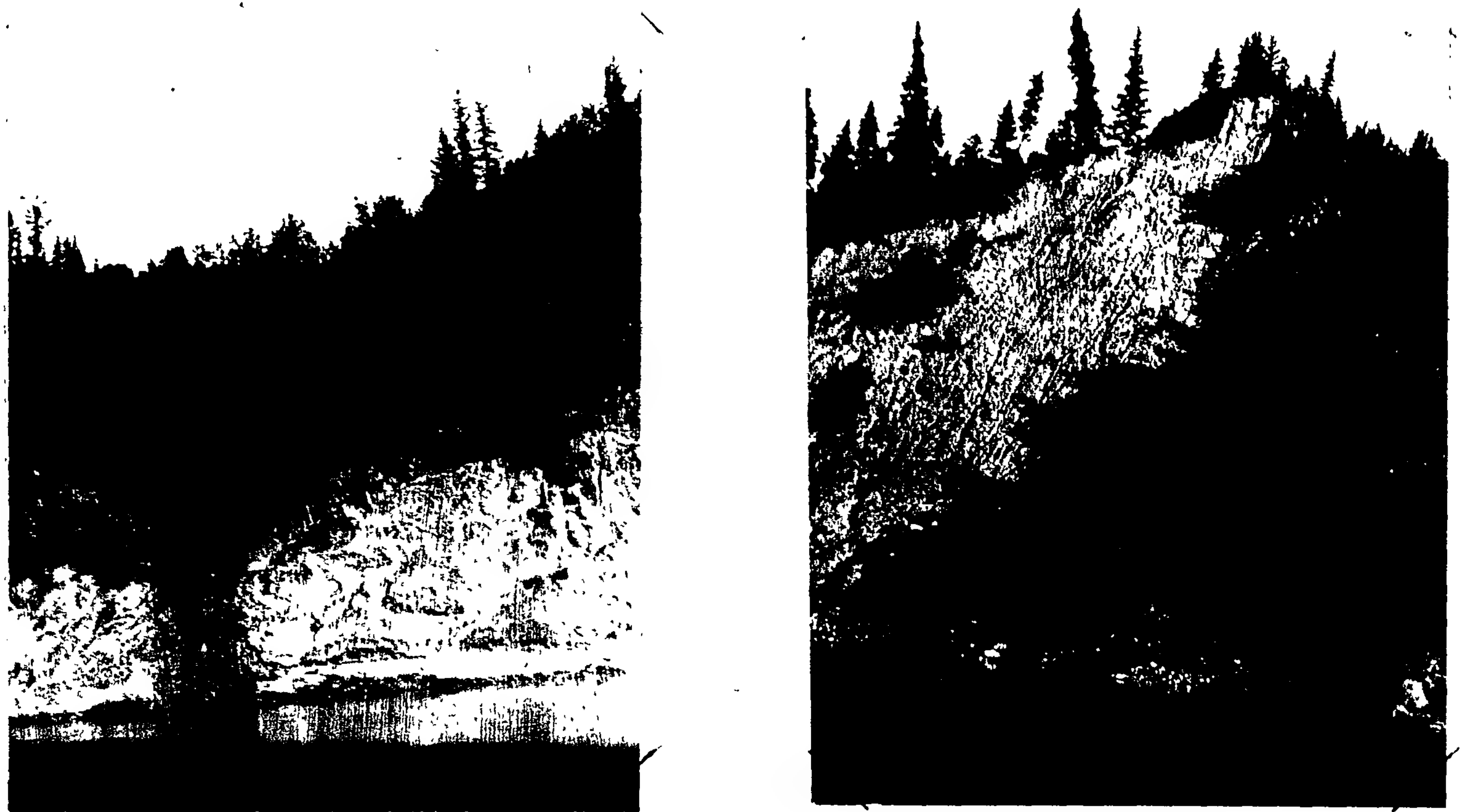
Where a more exact delineation of the river channel or bottom was desired, parallel ranges, 200 feet distant were sounded. The first two miles from Prince Albert were sounded at close range, as also some two miles in the vicinity of the Sturgeon River "Cut Off", where the special survey mentioned above was made.

Only in the "Little" or "Old Saskatchewan River" - a stretch of 53 miles - was it possible to conduct soundings by canoe; elsewhere, a 34 foot lumbermans' boat or "pointer" was employed. The sounding force consisted of a Sounder, Recorder, Steersman, one or two Signal men, and 6 oarsmen. The boat was equipped for 8 oarsmen, but with adequate rests, 6 men could keep good "line" in a current of from 3 to 6 miles an hour, where the river was 1000 feet wide and over, and when crossing the Rapids.

Ranges were staked ahead of the Sounding boat by two rodmen with canoes, after they had become somewhat expert in estimating distances. Stakes were located by two transits, one on each shore, angles and distances being recorded as the Stadia traverse was carried on.

An interval of time equivalent to four beats of the oars was allowed between soundings, this being found to give, in full stream, Soundings about 50 feet apart. A constant rate of speed on any one range, was maintained as much as possible, thus dispensing with the actual location of Soundings by transit.

Owing to starting the boat with "head up", there is a tendency for too many soundings on the starting side, which, when platted, will draw the bottom contours out a little from that side. Where the Channel lies close to one bank, the irregularity of contour lines may be quite noticeable,



Sliding Banks. Saskatchewan River below Fort a la Corne, 1911.

but, inasmuch as this fault will prevent the laying out on the Charts of a channel too close to the bank, the error is unimportant. The return lines likewise show the utmost prominence of shallow water on the opposite shore. Fifty (50) feet, however, may be regarded as the limit of error for any sounding on the line.

In platting the soundings, deductions are made ~~for~~ from the total length of a line, for bars outlined by the stadia, or paced across by the Sounder, when such bars were submerged.

Soundings thus secured in a river varying from 1000 to 2000 feet in width will, when platted to a scale of 500 feet to an inch, permit the tracing of contours defining the 6 foot depths with sufficient accuracy to base an estimate of the cost of developing a channel 6 feet deep and at least 150 feet wide wherever dredging is found necessary.

In view of the frequent channel changes to which the Saskatchewan is subject, any refined delineation of contours would have meant a useless waste of time, involving considerable additional expense, not warranted at present, and of little value after the probable lapse of several years before work is commenced.

During the season 1911, the transit division occasionally worked as a separate party some days in advance of the sounders.

The average rate of progress made was 3 miles per day; under normal conditions the sounding crew immediately followed the transit force.

<u>Levelling.</u> The levelling party was occupied during 1911 connecting up levels of the four sections incompleted the previous year. The start was made from Edmonton in June, 3 canoes being used for transport, and Le Pas reached September 27th.

One hundred and forty two (142) miles of levels were run between sections, and 12 miles of the 1910 levels on Section 2 re-run, forming a total of 154 miles for the season.

The continuous line of levels from Edmonton to Le Pas, 801 miles long, is marked by 302 Benches at intervals of 2 to 4 miles. Bench Marks could not be established permanently for obvious reasons; except where destroyed by falling banks, however, it is expected they will remain in good condition for a number of years. A complete list of Bench Marks from Edmonton to Lake Winnipeg, with distances and locations, is given in Appendix "E", Table I.

Hydraulic Party. Discharge measurements of the North Saskatchewan River at Edmonton, Battleford, Prince Albert, The Forks, and Le Pas were made in 1911. In addition the South Saskatchewan was metered at Saskatoon, The Forks, the Clearwater River, near Rocky Mountain House, and the Carrot and Pas Rivers in the lower Saskatchewan.

Two series of meterings were taken at each of the above places. Results of these measurements are given in Table IX Appendix "E".

The method in common use, of measuring the velocity of the current and the area of cross-section of stream, was followed in determining discharges.

Two Price Current Meters were used:- one large meter, W.&.L.E. Gurley pattern No.600 for measurements in the Saskatchewan, and one small meter, pattern No.621, indicating only every fifth revolution, for use in small streams in the Mountains. Both meters were rated at the Calgary rating station of the Irrigation Branch of the Dept. of the Interior.

Office work. The staff was engaged during the winter months in the computation and adjustment of the traverse from Prince Albert to Le Pas, the checking of levels and

adjusting of same to datum adopted, the reduction of soundings preparation of profiles, diagrams, etc.

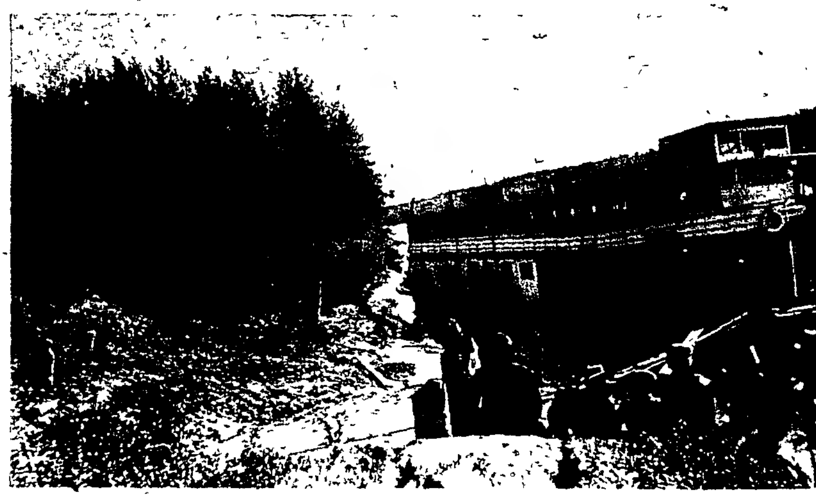
The platting of office plans was started and work well advanced when the survey was resumed the following spring. These plans are drawn to a scale of 500 feet to an inch on sheets of uniform size 3' x 10'. No less than 71 such sheets were required for the platting, on the scale adopted, of the 941 miles of River surveyed from 1910 to 1915.

Season 1912.

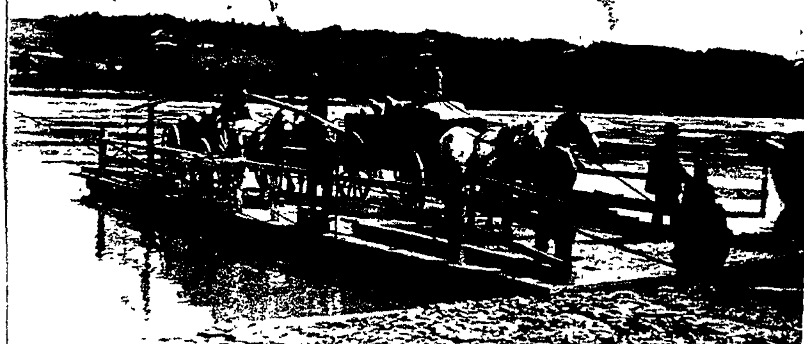
Field parties. Early in the summer of 1912, three field parties were organized for the season's surveys: A party of 19 men for traversing and sounding, a party of 11 men for special surveys and contour work, and a third party of 6 men for metering in the foot hills. The two river parties were organized at Edmonton, whilst the Hydraulic party assembled at Rocky Mountain House, which place was used as a base during the season. In addition, the Survey boat "Lafleur" with a crew of 7 men was commissioned, thus forming a total force of 44 men employed in 1912.

Transit and Sounding party. This party was detailed to traverse and sound the Saskatchewan from Edmonton towards Prince Albert. The Survey was started at the C.P.R. High Level Bridge during the latter part of May, and was brought to a close about 2¼ miles below Lashburn Ferry on August 21st.

During the three months work was carried on, 226½ miles of river were traversed by stadia, and 250 miles sounded on parallel ranges 400 feet apart, except in the nine rapids of this reach, where sounding ranges were staked 200 feet distant, in order to secure a closer definition of the channel. All islands were traversed, and their positions fixed, when necessary, by triangulation from main stations on the Shore traverse.



Pakan Landing, June 2nd, 1917.
76 Miles below Edmonton, Alta.



Shandro Ferry, June 1st, 1917.
94 Miles below Edmonton, Alta.

Steamer "City of Edmonton" loading wheat, hogs, etc. at Shandro Landing, June 1st, 1917.

Temporary gauges were set up at each camp and read daily at proper intervals, the records being used with those furnished by main gauging stations at Edmonton and Battleford, in establishing the low water plane for the reduction of soundings.

Transit and Contour party. Special detailed surveys of short sections of River in which nine of the principal Rapids below Edmonton occur, were made by the above named party. Twenty three and one half (23½) miles were traversed and Forty nine and one half miles (49½) contoured. Levels were carried from the nearest Bench Mark to the head and foot of rapids and the fall in each ascertained. Names of these rapids with distances from Edmonton follow:-

Mile	Name	Lgh. Miles	Fall	Mile	Name	Lgh. Miles	Fall
52½	Sucker Rap's. (series)	6¼	20'	166½	Wolf Pond Raps.	1¼	8.0'
77½	Victoria "	1¼	8'	173½	Moose Rap. No. 1	3/8	2.0'
105	Crooked "	½	4'	177⅛	" " No. 2	3/8	2.5'
133½	Eye "	3/8	3.5'	186¼	Frog Rapids	3	5.2'
163	Dog Rump " (series)	2¼	9.5'				

In addition to the above list, six smaller rapids from 1/8th. to 1¼ miles long, complete the series of 15 rapids below Edmonton. The Frog Rapids, of which there are two pitches, are the ~~last~~ to be met with, ending 6 miles above the mouth of the Vermilion River. From this point, islands and shifting sand bars predominate throughout the reach to Prince Albert.

A list of all Rapids in the Saskatchewan River from Edmonton to Lake Winnipeg will be found in the Appendix, "E" Table VI.

There are no steep pitches in any of the Rapids surveyed, the greatest fall being four (4) feet in one half mile, in the Crooked Rapids; these being most difficult to navigate on account of the swift waters and sharp turns in the Channel. Fairly good water is found in the Sucker, Victoria, and

Frog Rapids, but numerous large boulders in the channel render them unsafe except at high water, whilst the Eye, Dog Rump, Wolf Pond, and Moose Rapids, are very shallow and unnavigable at low stages.

Locks and Dams are not proposed for the improvement of any of the above named Rapids: the removal of boulders and dredging of shallow spots will afford the necessary channel depth to render them safely navigable at all stages.

Hydraulic party. Discharge measurements of the North Saskatchewan and Clearwater Rivers at Rocky Mountain House, and of the Brazeau, Nordegg, and Baptiste Rivers, were made in 1912, the information being required in connection with the study of flood control and regulation begun the preceding year.

Owing to loss of time due to unfavourable weather--rain having fallen almost incessantly during the summer months-and to the difficulty of travel between Rocky Mountain House and the region of the Baptiste and Brazeau Rivers, it was not possible to secure more than two meterings of each of these streams during the Season. These are given in Table IX. Appendix "E"Page

Sites for storage dams were found and examined by the Hydraulic Party on the Saskatchewan River below Rocky Mountain House, and on the Brazeau River, a few miles above its confluence with the Saskatchewan. Both these rivers flow in places through steep sandstone banks from 200 to 300 feet high, affording suitable locations for the building of such dams.

Possible dam sites on the Saskatchewan, and on several of its tributaries at headwaters, a number of which were examined or surveyed in 1912 and subsequent years, are shown on Plate G.

Gauges. New gauges were placed by the Survey Boat for sounding purposes at Pakan, Duvernay, and Vermilion River, gauges at these points having been carried away by floods in 1911. Intermediate gauging stations were also established at Ceepee (The Elbow) and Carlton Ferry in the Battleford-Prince Albert reach.

Permanent Gauges for use in connection with meterings were set by the Hydraulic Party in the Saskatchewan River at Rocky Mountain House, and in the Clearwater River about 2 miles from its mouth.

Records of daily gauge readings at fixed stations along the river from Rocky Mountain House to Le Pas were kept, as in previous years, until late in the season.

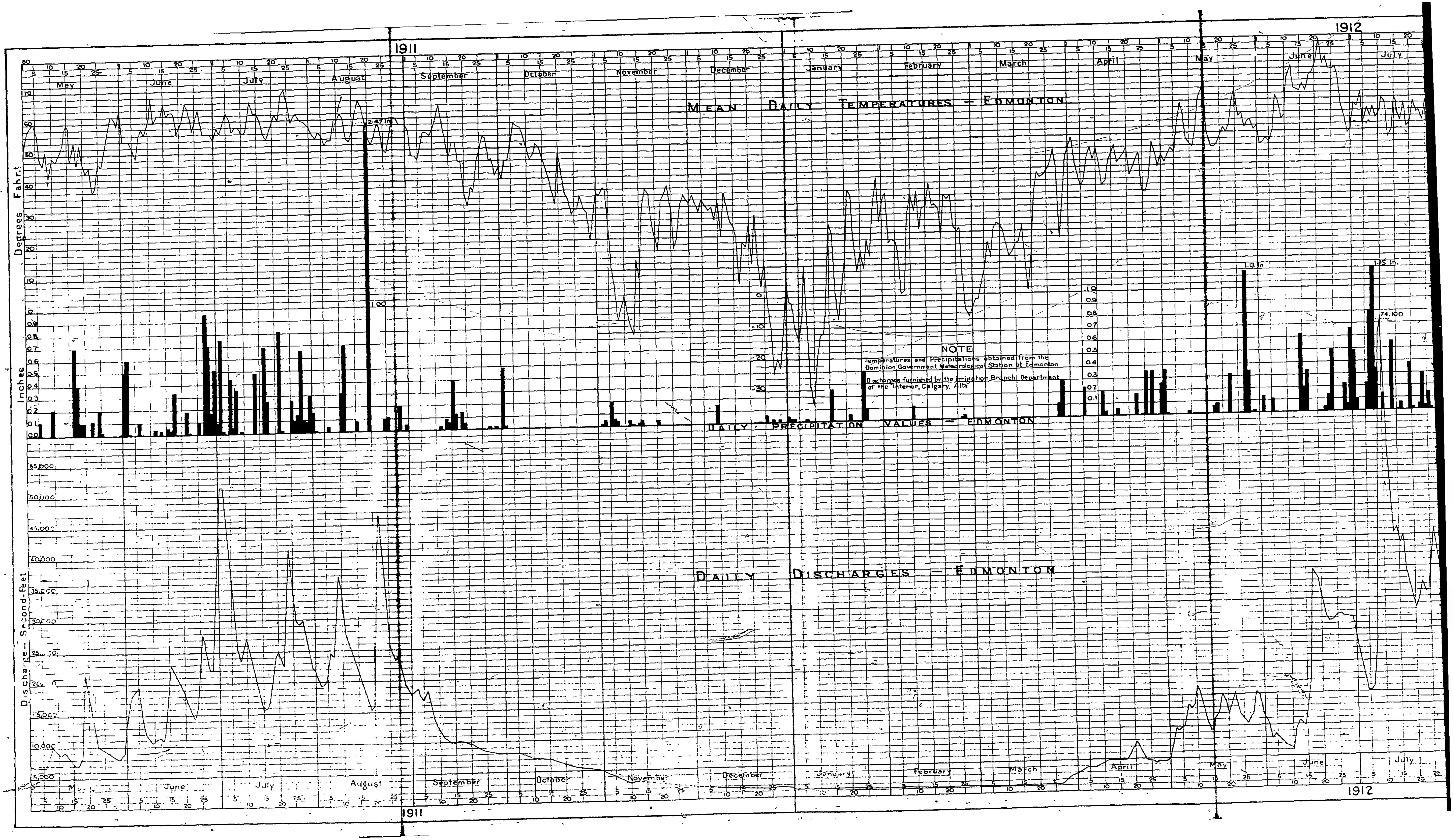
Office work. The calculating of field notes, adjustment of levels, reduction of soundings, etc. and platting of office plans, profiles, diagrams, etc. occupied the attention of the office staff during the winter months.

Season 1913.

Field Party. A combined Transit and Sounding Party consisting of 28 men was organized at Battleford on the 15th of May to carry on the Survey of that Section of River between Mile 250, or 2¼ miles below Lashburn Ferry, where work was discontinued in 1912, and Prince Albert.

The party was equipped with two "pointers" and eight canoes, and conveyed by the Survey Boat to a point 78 miles above Battleford, where work commenced.

The Survey was carried on continuously during the summer months; 243 miles of River having been covered by the time Prince Albert was reached on the 15th of August. After effecting a connection with the Prince Albert-Le Pas Survey made in 1911, the party was reorganized, part of the men being paid off, the remainder proceeding by train to Le Pas where the Survey of the Lower Saskatchewan River was resumed.


1911
1912
Mean Daily Temperatures – Edmonton
Daily Precipitation Values – Edmonton
Daily Discharges – Edmonton
Degrees Fahr.t
Inches
Discharge – Second-Feet
NOTE
Temperatures and Precipitations obtained from the Dominion Government Meteorological Station at Edmonton
Discharges furnished by the Irrigation Branch, Department of the Interior, Calgary, Alta.
2.47 In.
1.13 In.
1.15 In.
74,100

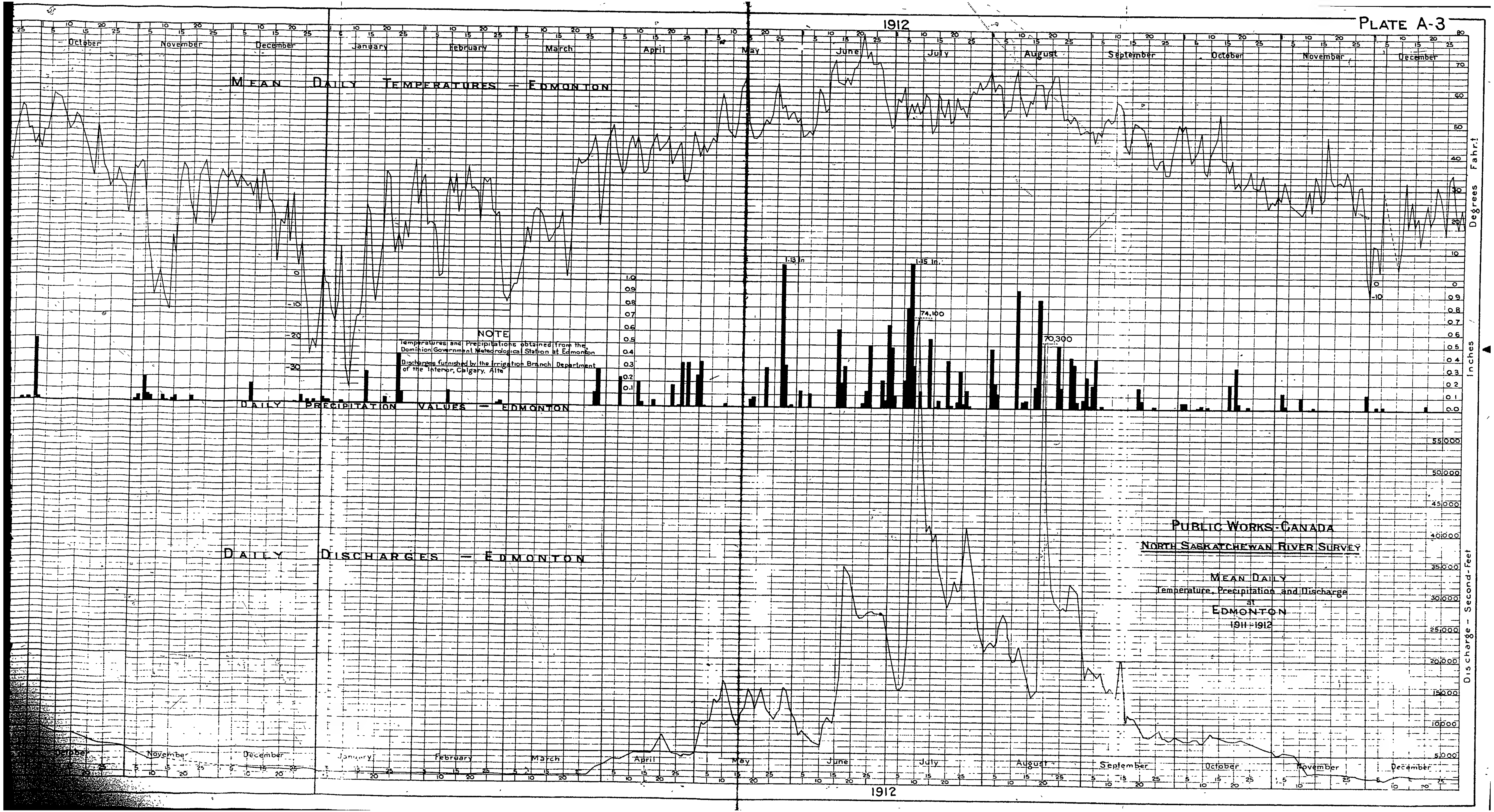
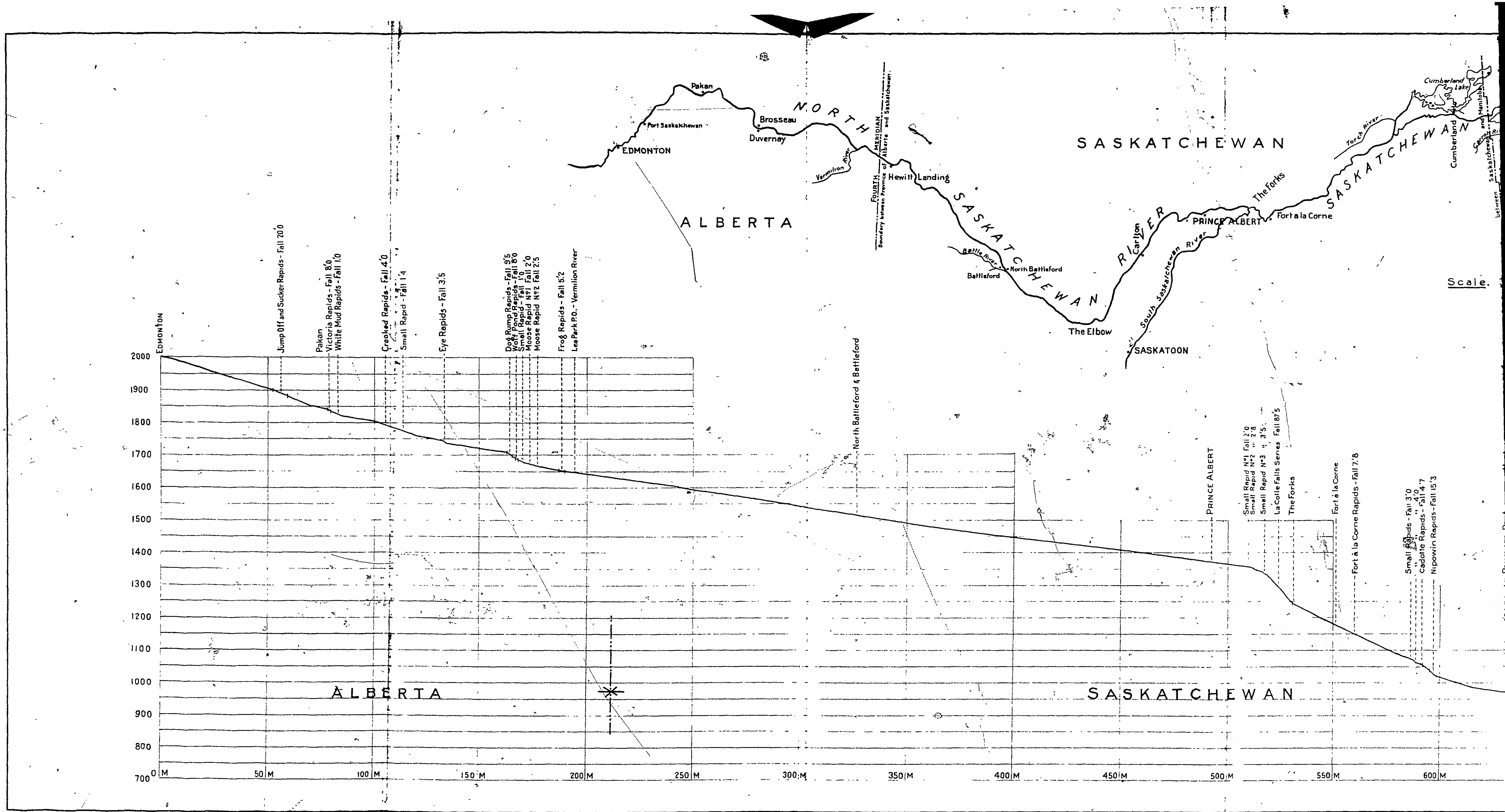
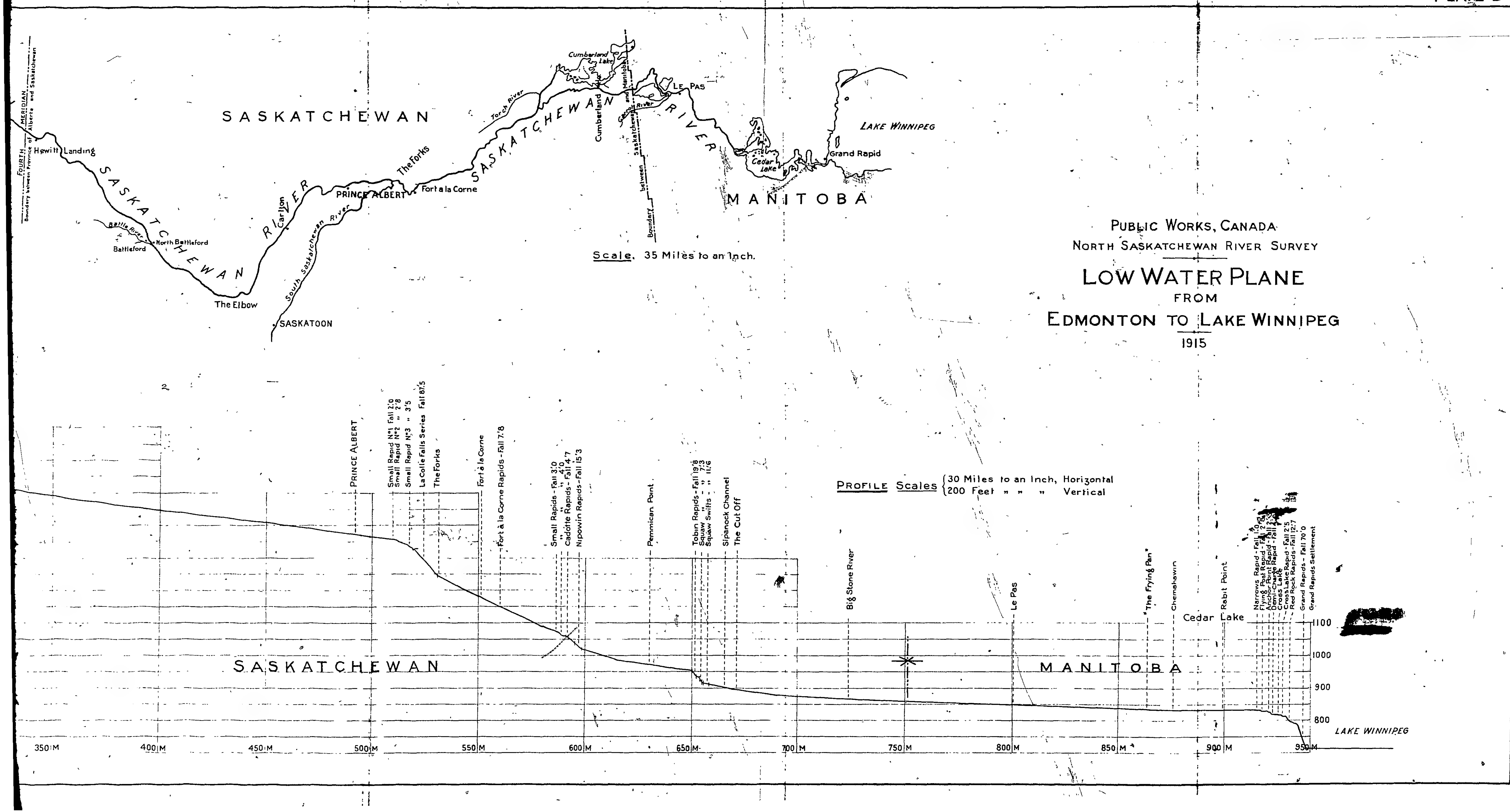


PLATE A-3
1912
Mean Daily Temperatures — Edmonton
Daily Precipitation Values — Edmonton
Daily Discharges — Edmonton
NOTE
Temperatures and Precipitations obtained from the Dominion Government Meteorological Station at Edmonton
Discharges furnished by the Irrigation Branch Department of the Interior, Calgary, Alta.
1.13 in.
1.15 in.
74,100
70,300
Degrees Fahr.t
Inches
Discharge - Second-Feet
Public Works-Canada
North Saskatchewan River Survey
Mean Daily
Temperature, Precipitation and Discharge
at
Edmonton
1911-1912



EDMONTON
Port Saskatchewan
Pakan
Brosseau
Duvernay
NORTH SASKATCHEWAN RIVER
Vermilion River
FOURTH MERIDIAN Boundary between Province of Alberta and Saskatchewan
Hewitt Landing
ALBERTA
SASKATCHEWAN
Battle River
North Battleford
Battleford
The Elbow
Carlton
South Saskatchewan River
SASKATOON
PRINCE ALBERT
The Forks
Fort a la Corne
Torch River
Cumberland Lake
Cumberland
SASKATCHEWAN
Scale.
EDMONTON
Jump Off and Sucker Rapids - Fall 20.0
Pakan
Victoria Rapids - Fall 8.0
White Mud Rapids - Fall 1.0
Crooked Rapids - Fall 4.0
Small Rapid - Fall 1.4
Eye Rapids - Fall 3.5
Dog Rump Rapids - Fall 9.5
Wolf Pond Rapids - Fall 8.0
Small Rapid - Fall 1.0
Moose Rapid Nº1 Fall 2.0
Moose Rapid Nº2 Fall 2.5
Frog Rapids - Fall 5.2
Lea Park P.O. - Vermilion River
North Battleford & Battleford
PRINCE ALBERT
Small Rapid Nº1 Fall 2.0
Small Rapid Nº2 " 2.8
Small Rapid Nº3 " 3.5
La Colle Falls Series Fall 87.5
The Forks
Fort à la Corne
Fort à la Corne Rapids - Fall 7.8
Small Rapids - Fall 3.0
Cadotte Rapids - Fall 4.7
Nipowin Rapids - Fall 15.3
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
0 M
50 M
100 M
150 M
200 M
250 M
300 M
350 M
400 M
450 M
500 M
550 M
600 M
ALBERTA
SASKATCHEWAN

Plate B


PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
LOW WATER PLANE
FROM
EDMONTON TO LAKE WINNIPEG
1915
Scale. 35 Miles to an Inch.
SASKATCHEWAN
MANITOBA
SASKATCHEWAN RIVER
Fourth Meridian
Boundary between Province of Alberta and Saskatchewan
Hewitt Landing
Battle River
Battleford
North Battleford
The Elbow
Carlton
South Saskatchewan River
SASKATOON
PRINCE ALBERT
The Forks
Fort a la Corne
Torch River
Cumberland Lake
Cumberland
Boundary between Saskatchewan and Manitoba
Le Pas
Cedar Lake
Grand Rapid
LAKE WINNIPEG
PROFILE Scales {30 Miles to an Inch, Horizontal
200 Feet " " " Vertical
Prince Albert
Small Rapid Nº1 Fall 2.0
Small Rapid Nº2 " 2.8
Small Rapid Nº3 " 3.5
La Colle Falls Series Fall 61.5
The Forks
Fort à la Corne
Fort à la Corne Rapids - Fall 7.8
Small Rapids - Fall 3.0
" " " 4.0
Cadotte Rapids - Fall 4.7
Nipowin Rapids - Fall 15.3
Pemmican Point
Tobin Rapids - Fall 19.8
Squaw " " 7.3
Squaw Swifts " 11.6
Sipanock Channel
The Cut Off
Big Stone River
Le Pas
"The Frying Pan"
Chemahawin
Cedar Lake
Rebit Point
Narrows Rapid - Fall
Flying Post Rapid - Fall
Anchor Point Rapid - Fall
Demi-Charge Rapid - Fall
Cross Lake
Cross Lake Rapid - Fall 2.5
Red Rock Rapids - Fall 12.7
Grand Rapids - Fall 70.0
Grand Rapids Settlement
LAKE WINNIPEG
1100
1000
900
800
350 M
400 M
450 M
500 M
550 M
600 M
650 M
700 M
750 M
800 M
850 M
900 M
950 M

Method employed. The method of "cross river" sighting for traversing by stadia, and of estimating distances for the staking of sounding ranges, used in 1912 on the Survey of the upper part of the River, was found efficient and advantageous, as after travelling 250 Miles, the estimated distances by pacing or by boat, had only exceeded the true distance by less than five miles. Work in 1913 was therefore carried on under this system, the only change made being that four transits were used instead of two. It was found advantageous to use the two extra transits, to enable the party to define more rapidly the large number of sand bars and islands predominating, especially in the Battleford district, and to maintain sounding ranges staked in advance of the Sounders. By working double parties of two transitmen each, it was possible to survey the two channels formed by an island or sand bar simultaneously, thereby saving valuable time necessarily lost in paddling up river, which would have been lost if the channels had been surveyed independently.

Lashburn Ferry to Prince Albert. The River between Lashburn Ferry and Prince Albert assumes the character of a typical prairie stream; no rapids are involved for this section, the fall throughout being uniform and averaging 9/10th. of a foot per mile. It is generally wide and shallow and full of sand bars and islands. The width varies from 1000 to 1200 feet in its narrowest part, to 4600 feet, or over three quarters of a mile, in the vicinity of Battleford. Although there are frequent short stretches from 10 to 12 feet deep at low water, the average depth is less than 6 feet. The bottom is mostly sand and soft material overlaying clay and hard pan. Gravel is occasionally met with. Banks rise from 100 to 200 feet above the river to the level of the prairie, which in places is quite distant from the water, forming a wide valley, mostly wooded with poplar and occasional clumps of spruce. The wooded banks become more plentiful in the lower part of the reach.

The tributaries, with the exception of the Battle River, are small, the principal ones being Turtle River, Jack Fish Creek, and Shell Brook, flowing from the North, and Eagle Hill Creek, discharging from the South near the Elbow.

Improvements. A large amount of dredging, and the building of extensive dykes to divert and confine the flow into the dredged channel, will be required to render this section of the river navigable. Maintenance charges will be heavy on account of the shifting sand which is continually wearing away in some places and filling in at others. This action is very rapid at certain stages, one case being observed where a width of 10 feet was washed away from the side of a sand bar within 10 hours, this particular bar being from 2 to 5 feet above the surface of the water. Hubs that were set immediately before the extreme high water in July 1912, were found to be covered with as much as 9 inches of silt after the flood subsided.

It is expected that by means of low dykes, disposed at an angle with the current, in places where bars can form behind such works, the silting of the navigable channel will, to a large extent, be prevented, thereby reducing maintenance charges accordingly.

Locations of proposed dykes throughout the River are shown on Charts accompaning this report. A typical section of same appears on Plate F. attached. (See opposite page 61).

Bridges and Ferries. The country between Lashburn Ferry and Prince Albert is well settled, the main line of the Canadian Northern Railway running parallel to the river from Paynton to Langham, or for a distance of 117 Miles, and being within six miles of the river at any point along this reach.

Two high level railway bridges, with navigation spans, cross the River, one about 7 miles above Battleford, and the other at Ceepee ("The Elbow"). Both of these bridges are on the main line of the Canadian Northern Railway. A combined highway and railway bridge on a branch line of the same

railway, with swinging draw span to accomodate navigation, also crosses the River at Prince Albert; and two high level highway bridges over the North and South Channels respectively at Battleford, afford direct communication between that town and North Battleford.

Several scow ferries, established by the Provincial Government, provide crossings of the river on main roads of travel and to the railway. A list of Ferries on the North Saskatchewan River will be found in Appendix "E" Table XII.

Survey from Le Pas-East. On the arrival of the boats and equipment, which were shipped by rail from Prince Albert after the reorganization of the party in August, the survey of the portion of the River between Le Pas and Lake Winnipeg was begun. The party consisted of 15 men.

As the Country East of Le Pas was not subdivided, a different system had to be used for the Survey of the Lower Saskatchewan River. The method previously followed of a stadia survey with frequent ties to township or section corners of Dominion Lands Surveys, was abandoned, and in substitution a system of secondary triangulation adopted. This was considered essential for the accurate mapping of the 140 mile stretch to Lake Winnipeg, as in this distance, ties with the 13th and 14th base lines of Dominion Lands Surveys were possible only at a few points where these lines intersect the river and the shores of Cedar Lake. A base, from which the triangulation was extended, was measured on the Hudson's Bay Railway Bridge at Le Pas, and connected with the survey completed to that place in 1911.

Levels were carried along by the party as the triangulation progressed, bench marks being set approximately at intervals of one mile. Soundings were taken, as previously, on parallel ranges, 500 feet apart, range stakes being set with transit and stadia.

The survey was suspended for the season on the 7th of October, 29 miles of River having been triangulated, traversed,

levelled, and sounded below Le Pas. The party was brought up River by the Ross Navigation Company and disbanded the following day.

It may be mentioned here that navigation between Le Pas and Cedar Lake was closed on the 18th of October, heavy ice having formed in the reach on that date. This is believed to be the earliest recorded freeze up of the Saskatchewan River.

A list of dates on which the ice in the North Saskatchewan River went out at Prince Albert, each year from 1878 to 1916, and of dates on which the River froze over from 1899 to 1916, is given in **Table XI-App.E.** The list was compiled from actual records made at the time by Messrs. R. Gwynne and T. E. Parker of Prince Albert.

<u>Description.</u> The River for the first 29 miles below Le Pas varies from 700 feet to 1800 feet in width, and from 8 feet to 25 feet in depth, the least depth being ample for navigation purposes. The current at low water is very slow, running less than 2 miles an hour, the average fall in the river being only 2/10 of a foot per mile.

Eighteen miles below Le Pas, Moose Lake or Summerberry River is met with. This is but another name for one of the two principal Channels into which the Saskatchewan River divides at this point. After leaving the Main Channel, the Summerberry River flows in an Easterly direction towards Moose Lake, and discharges partly into that Lake through a small stream called Moose Lake Creek. At Moose Lake Creek, it makes a sharp turn and follows a Southerly course for about 20 miles, dividing once more into two channels, the first channel flowing South Westerly until it meets the Saskatchewan 6 miles above Cedar Lake Post (Chemahawin), the other continuing in a South Easterly direction towards the North Arm of Cedar Lake into which it discharges.

The banks, which are about 25 feet high at Le Pas, gradually become lower further down river, and at the point where the Survey ended, were no more than 3 or 4 feet above

the water level. These banks are thickly wooded with poplar for several miles below Le Pas where the poplars cease and are replaced by a fringe of willows only a few hundred feet wide on each shore. The whole tract of country along this reach is flat and almost entirely under water, being covered by a succession of broad shallow Lakes and Sloughs, filling through numerous channels and "Cut Offs", when the River is in flood.

Mountain Party. A party of 5 men, with 7 pack horses, left Rocky Mountain House on the 8th of July, to investigate the storage possibilities on the Head Waters of the North Saskatchewan River, and its principal tributaries in the foot-hills, for flood control purposes. The party was engaged on this work until the early fall when it returned to Rocky Mountain House and was disbanded on the 19th of September.

Three possible dam sites were examined on the Clearwater River, two of which, however, were found to be of insufficient storage capacity and abandoned. The location of the site selected is approximately in Townships 34 and 35, Ranges 10 and 11, West of the 5th Meridian, in a gap of the Brazeau Mountains, about 55 miles from Rocky Mountain House, and is shown on Plate G-1, attached. A cross section of the valley on Centre line of dam and contour line at elevation selected for crest of dam, appear on plan. The dotted contour line on west end of plan is approximate only. It was not considered advisable to continue the survey further up the River, inasmuch as the valley narrows to such an extent that no appreciable storage would be provided.

The site is an excellent one and will afford a storage capacity of 214,500 acre-feet with a dam 144 feet in height. The flooded area in round numbers is 3,131 acres, and the fall of the river approximately 27 feet per mile.

At each end of the proposed dam is a mountain of solid rock and loose rock; ample building timber is found in the neighborhood. The valley is of a gravelly nature, all material

for construction purposes being available on the spot. Under such conditions a dam, though expensive, could be economicall built to the height stated.

Owing to lack of time, no borings were made to ascertai the depth at which a suitable foundation for such a dam could be found, but there is no reason to doubt however, that solid rock foundation is accessible within a very few feet from the surface.

The watershed of the Clearwater dam site is approximatel 473 square miles.

An advantageous site for a dam was also found in a gap between two mountains on the Saskatchewan River at Kootenay Plains, about 75 miles up River from Rocky Mountain House. This is also shown on plate G-1. The location is approximately in Township 39, Ranges 14 and 15, West of the 5th Meridian, and probably this is the most suitable site on that River. It is only 7 miles by trail from the Railway at Mire Creek. Gravel and sand may be obtained from the river bed adjoining the site, jack pine and spruce grow on the flats above, while rock may be had in unlimited quantities from the mountains on either side of the gap. Conditions therefore are in every way favourable for economical construction at this point.

It is possible to create a reservoir at "The Gap" by means of a dam having a crest elevation 175 feet above ordinary level with a spillway 1000 feet or more wide. Such a reservoir would provide a storage of 309,000 acre-feet. An area of about 4,290 acres would be flooded by this dam.

The watershed at "The Gap" is approximately 1,761 square miles and the fall in the river about 11 feet to the mile.

It is not proposed to construct dams of the heights mentioned on either the Clearwater or Saskatchewan Rivers, as the cost of such structures would be prohibitive. The control and regulation of flood waters can probably be effected

by means of dams not exceeding one hundred feet in height, providing a sufficient number of sites are available at headwaters.

Sites surveyed in 1913 and subsequent years with drainage area of proposed reservoirs are shown on Plate G. attached. Possible dam sites remaining unsurveyed, and metering sections occupied in 1914 and 1915, are also shown on this Plate.

Gauges. Records of the daily readings of water gauges at the following main stations were ~~kept in 1913~~:- Edmonton, Battleford, The Elbow (Ceepee), Prince Albert, and Le Pas.

The gauge established in the upper part of the River, near Rocky Mountain House, at the mouth of the Clearwater River, was read at noon daily throughout the season.

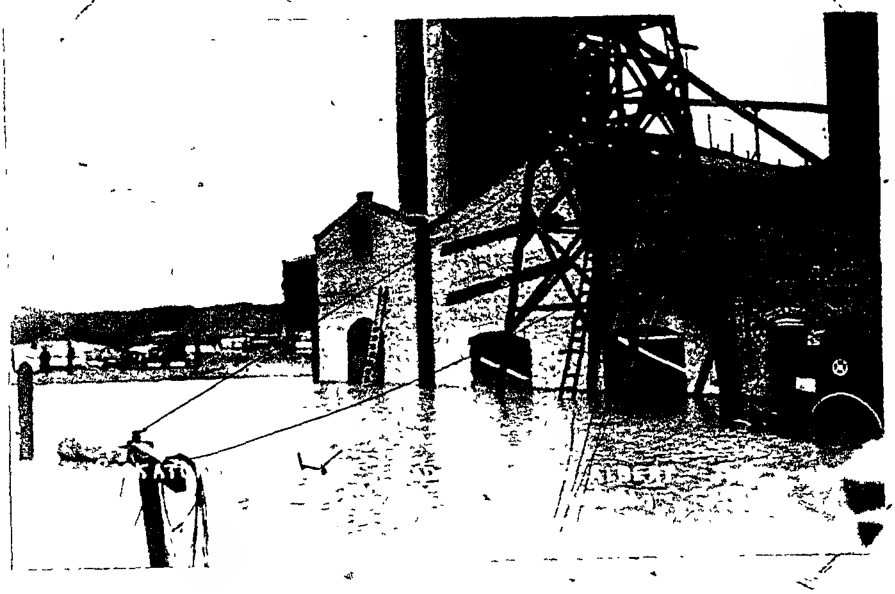
Office work. The office staff at Prince Albert was engaged during the winter months in reducing soundings, calculating triangulation, adjusting stadia traverse, levels, etc., for platting on office plans. Work on these was well in hand when the survey was resumed in 1914.

Season 1914.

Field parties. Three survey parties were put in the field in 1914:- A Transit, Level and Sounding party, of 25 men, to continue the Survey of the River East of Le Pas towards Lake Winnipeg; a Contour party of 6 men, to define the limits of flooded areas in the event of Locks and Dams being used for the improvement of the Cadotte, Nipawin, and Tobin Rapids below Prince Albert, and an Hydraulic Party of 6 men to secure discharge measurements of the Saskatchewan River and its tributaries in the Mountains, and to investigate possible sites for dams and storage reservoirs in connection with a project for flood control and regulation.

Transit, Level and Sounding Party. The party was assembled at Le Pas on the 12th of May, proceeding a few days later with boats and canoes to a point 29 Miles down

N. Saskatchewan River. Flood June-July, 1915.
Bridge at Prince Albert loaded down with
empty freight cars.



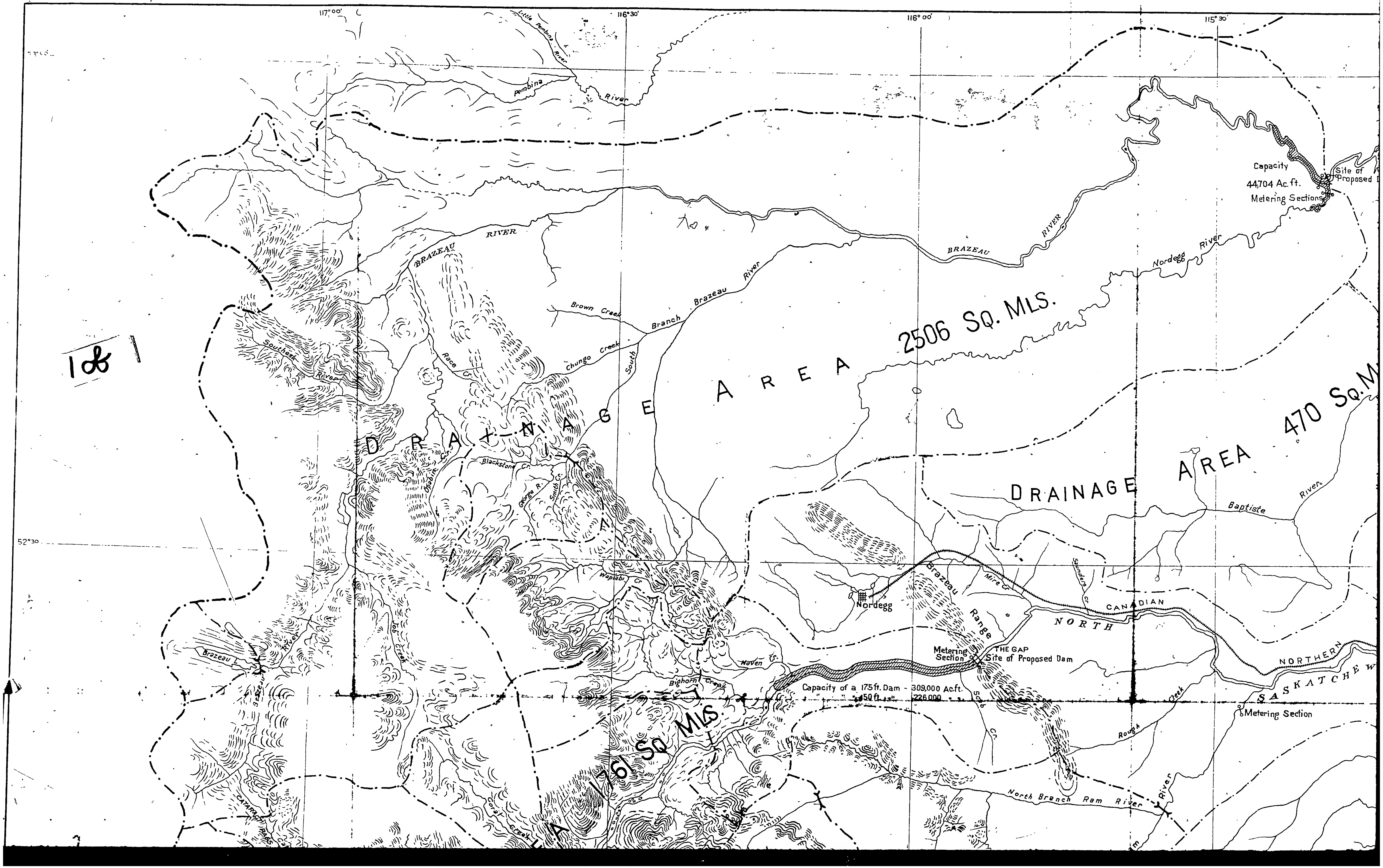
N. Saskatchewan River. Flood June-July, 1915.
Prince Albert Lumber Co's. Mill, Goschen.

N.Saskatchewan River 2 miles below the mouth of Siffleur River-Looking up stream-Sept.20,1914.

N.Saskatchewan River above mouth of Siffleur River Metering Section-Sept.17,1914. Looking up stream.

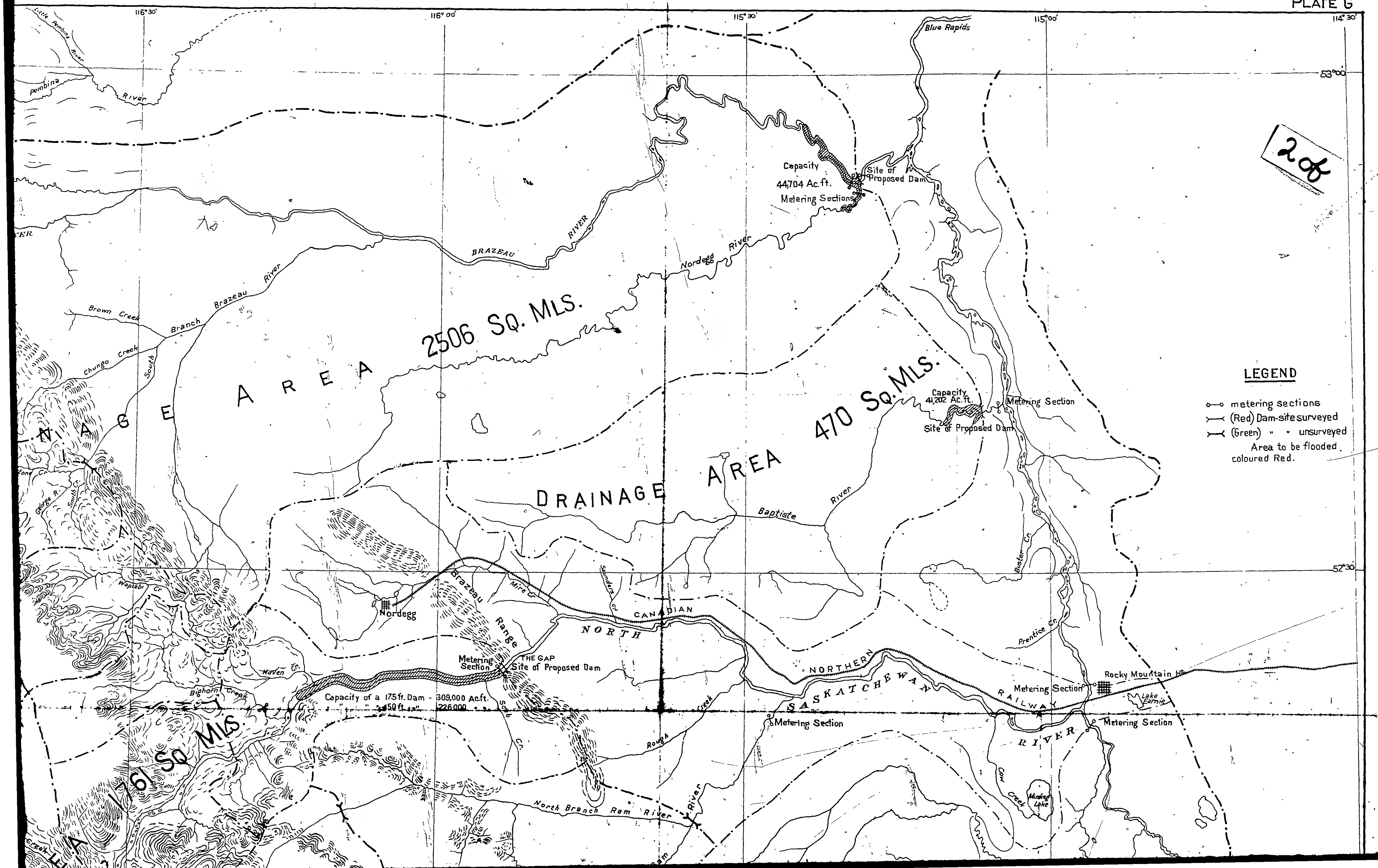
Brazeau River. Dam site about 1/5 mile below the mouth of the Nordegg River.

108



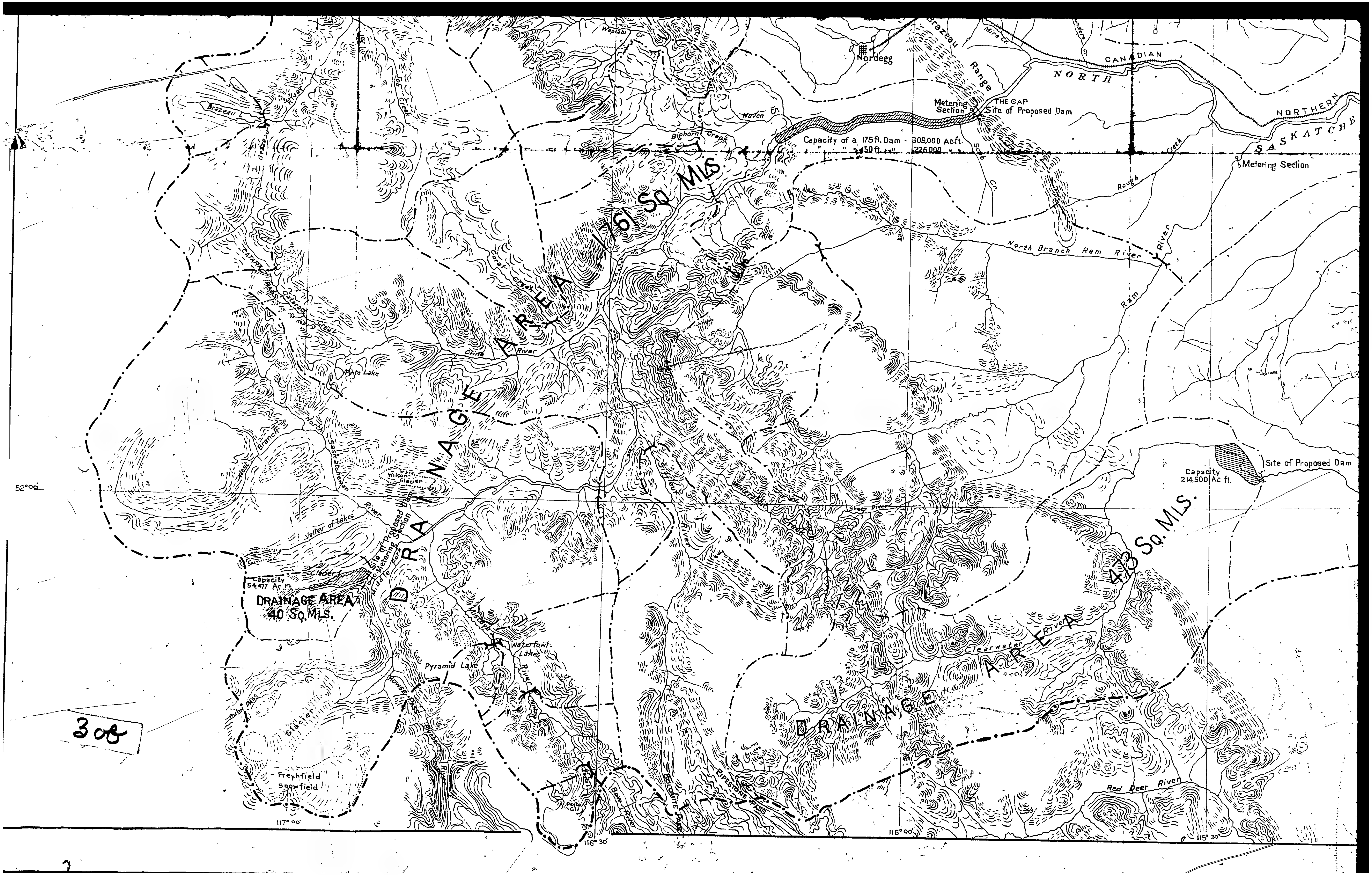
117°00'
116°30'
116°00'
115°30'
52°30'
Little Pembina River
Pembina River
BRAZEAU RIVER
BRAZEAU RIVER
Capacity
44,704 Ac.ft.
Site of Proposed D
Metering Sections
Nordegg River
Brown Creek
South Branch Brazeau River
Chungo Creek
Race Cr.
Southesk River
DRAINAGE AREA 2506 SQ. MLS.
DRAINAGE AREA 470 Sq. M
DRAINAGE AREA
Baptiste River
Blackstone Cr.
George R.
Smith Cr.
Wapiabi Cr.
Nordegg
Brazeau Range
Mire Cr.
Sanders Cr.
NORTH CANADIAN NORTHERN
Metering Section
THE GAP
Site of Proposed Dam
Capacity of a 175 ft. Dam - 309,000 Ac.ft.
" " 150 ft " 226,000
Haven
Bighorn Creek
Job Creek
Brazeau
Brazeau River
Scab Cr.
SASKATCHEWAN
Metering Section
Rough Creek
1761 SQ. MLS.
North Branch Ram River
River
Coral Creek

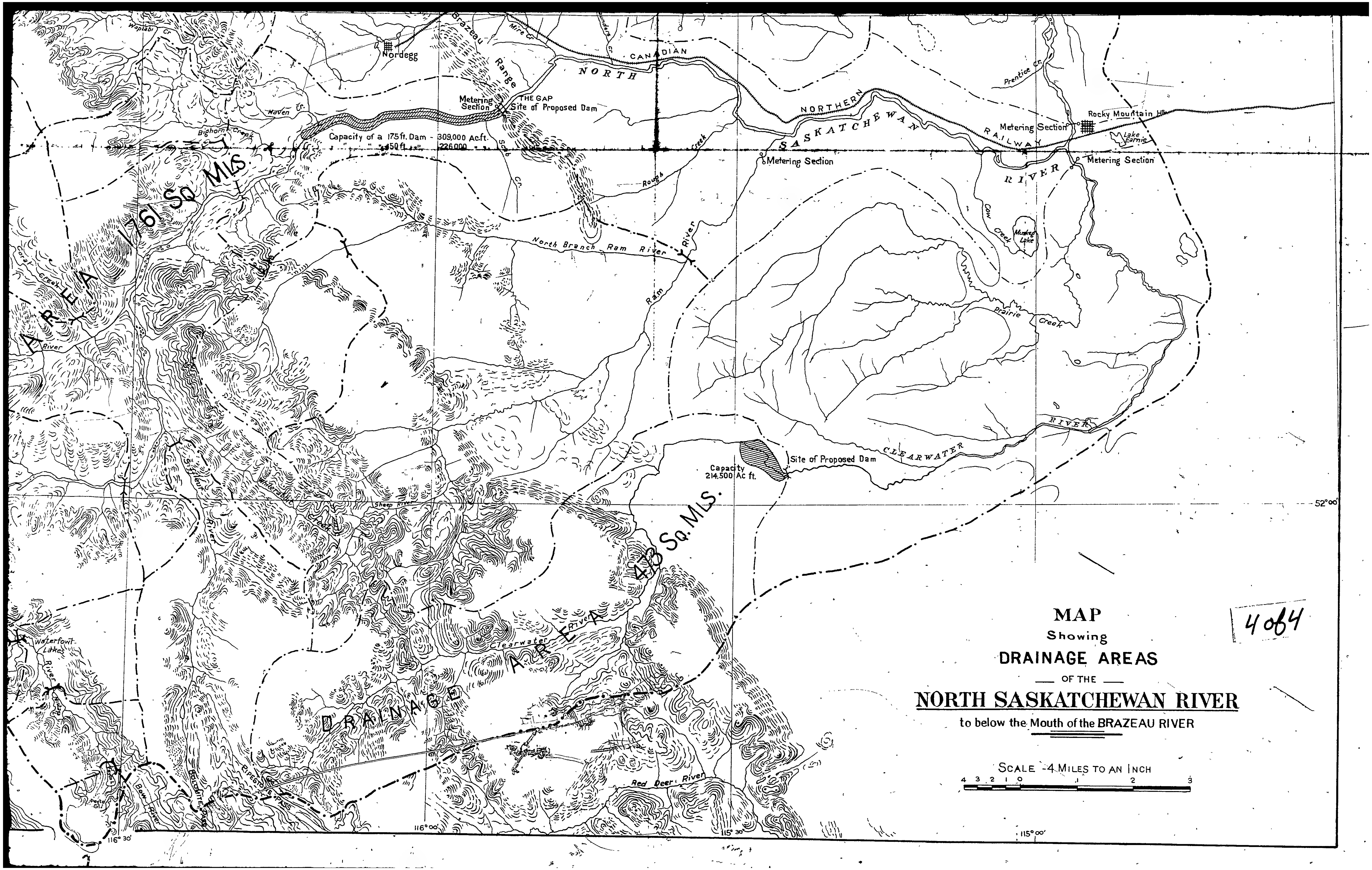
PLATE G



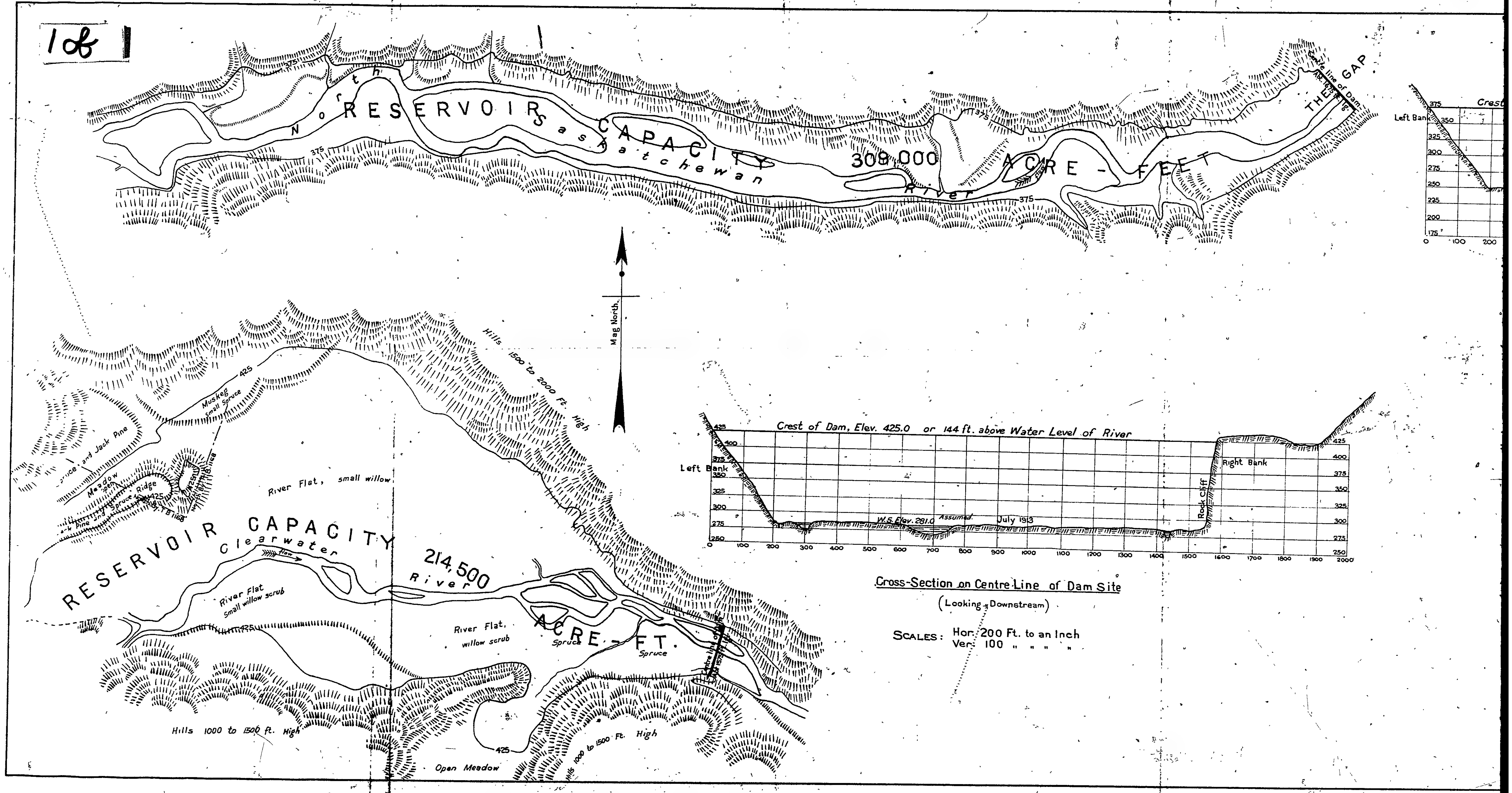
LEGEND
metering sections
(Red) Dam-site surveyed
(Green) " " unsurveyed
Area to be flooded coloured Red.
DRAINAGE AREA 2506 SQ. MLS.
DRAINAGE AREA 470 SQ. MLS.
161 SQ. MLS.
Capacity 44,704 Ac. ft.
Site of Proposed Dam
Metering Sections
Capacity 41,202 Ac. ft.
Metering Section
Site of Proposed Dam
THE GAP
Site of Proposed Dam
Capacity of a 175 ft. Dam - 309,000 Ac.ft.
" " 150 ft. " - 226,000
Blue Rapids
Pembina River
Little Pembina River
BRAZEAU RIVER
Nordegg River
Brown Creek
South Branch Brazeau River
Chungo Creek
Baptiste River
Nordegg
Brazeau Range
Mire Cr.
Saunders Cr.
CANADIAN NORTHERN RAILWAY
NORTH SASKATCHEWAN RIVER
Rough Creek
North Branch Ram River
Ram River
Bighorn Creek
Haven Cr.
Wapiabi Cr.
Prentice Cr.
Baxter Cr.
Rocky Mountain Ho.
Lake Earnie
Cow Creek
Muskeg Lake
116°30'
116°00'
115°30'
115°00'
114°30'
53°00'
52°30'

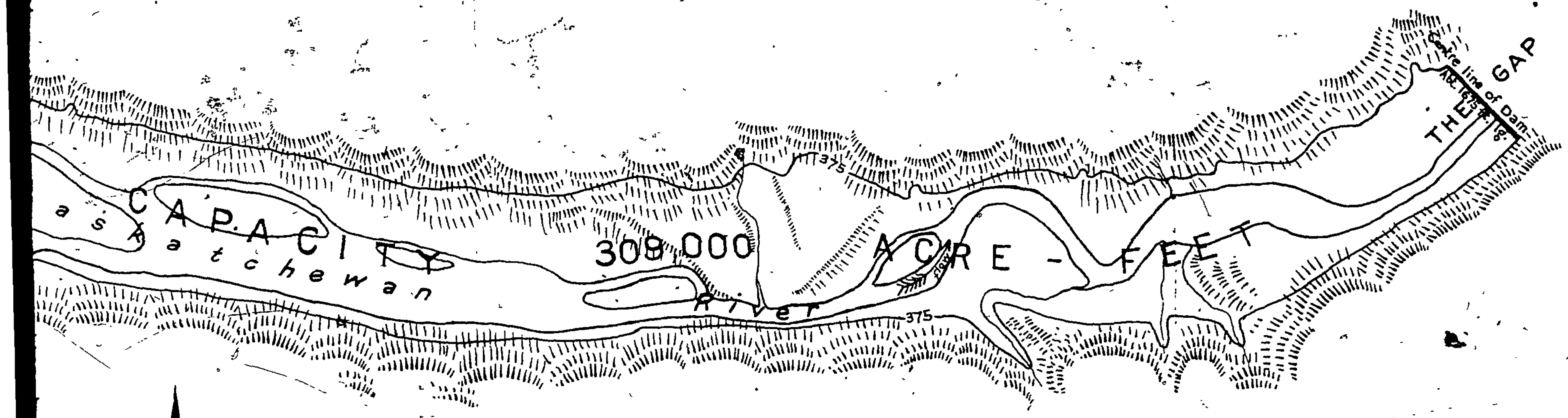
208

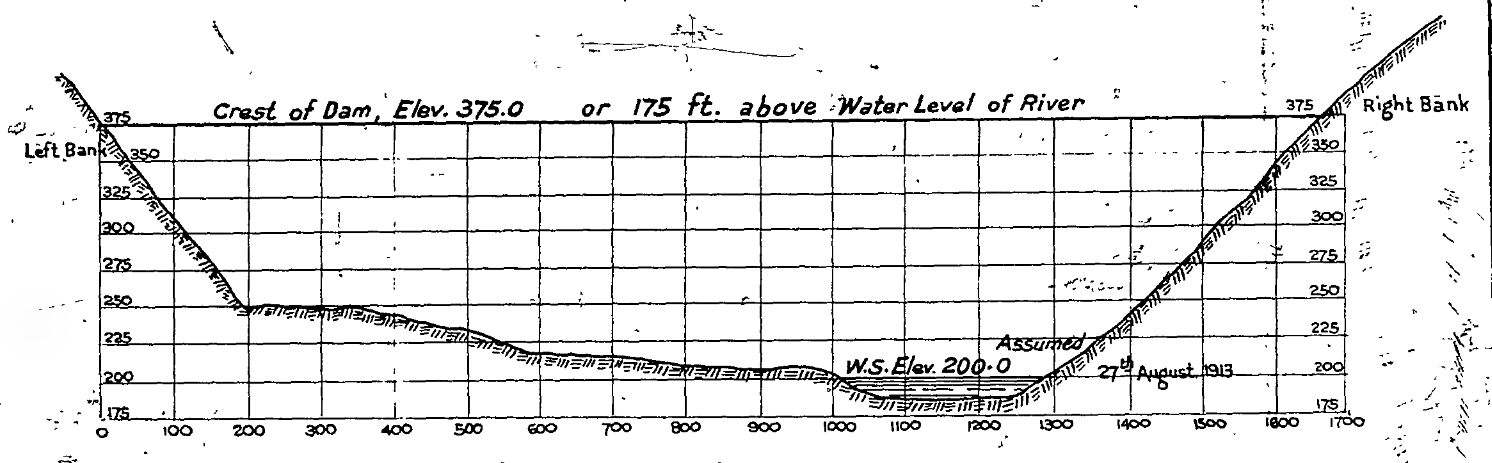

Nordegg
Brazeau Range
NORTH CANADIAN NORTHERN
SASKATCHE
Metering Section
THE GAP
Site of Proposed Dam
Capacity of a 175 ft. Dam - 309,000 Ac.ft.
" " 150 ft " 226,000
Wapiabi Cr.
Bighorn Creek
Haven Cr.
Brazeau
DRAINAGE AREA 1761 Sq. Mls.
Cline River
Pinto Lake
North Branch Ram River
Ram River
Rough Creek
Metering Section
Site of Proposed Dam
Capacity 214,500 Ac ft.
Wilson Glacier
Valley of Lakes
Site of Proposed Dam
Middle Fork Metering Section
Capacity 54,477 Ac. Ft.
DRAINAGE AREA 40 Sq. Mls.
Sheep River
Siffleur River
Waterfowl Lakes
Pyramid Lake
Clearwater River
DRAINAGE AREA 410 Sq. Mls.
Freshfield Snowfield
Glacier
Bow River
Pipestone Pass
Red Deer River
52°00'
117°00'
116°30'
116°00'
115°30'
308


MAP
Showing
DRAINAGE AREAS
OF THE
NORTH SASKATCHEWAN RIVER
to below the Mouth of the BRAZEAU RIVER
SCALE - 4 MILES TO AN INCH
4 3 2 1 0 1 2 3
4064
Nordegg
Brazeau Range
Waptabi Cr.
Mire Cr.
CANADIAN NORTHERN RAILWAY
NORTH SASKATCHEWAN RIVER
Metering Section
THE GAP
Site of Proposed Dam
Haven Cr.
Bighorn Creek
Capacity of a 175 ft. Dam - 309,000 Ac.ft.
" " 150 ft " 226,000
Scab Cr.
Rough Creek
Metering Section
Prentice Cr.
Rocky Mountain Hs.
Metering Section
Lake Earnie
Metering Section
Cow Creek
Muskeg Lake
AREA 1761 SQ. MLS.
North Branch Ram River
Ram River
Prairie Creek
Coral Creek
River
CLEARWATER RIVER
Site of Proposed Dam
Capacity 214,500 Ac. ft.
Sheep River
52°00'
DRAINAGE AREA 413 SQ. MLS.
Clearwater River
Waterfowl Lakes
River
Red Deer River
Bow River
Pipestone Pass
116°30'
116°00'
115°30'
115°00'

1 of 1


RESERVOIR CAPACITY 308,000 ACRE-FEET
North Saskatchewan River
THE GAP
Centre Line of Dam
Left Bank
Crest
Mag. North
Hills 1500 to 2000 Ft. High
Muskeg Small Spruce
Spruce and Jack Pine
Meadow
Jack Pine and Spruce Ridge
River Flat, small willow
RESERVOIR CAPACITY 214,500 ACRE-FT.
Clearwater River
Flow
River Flat Small willow scrub
River Flat, willow scrub
Spruce
Hills 1000 to 1500 ft. High
Hills 1000 to 1500 Ft. High
Open Meadow
Crest of Dam, Elev. 425.0 or 144 ft. above Water Level of River
Left Bank
Right Bank
Rock Cliff
W.S. Elev. 281.0 Assumed. July 1913
Cross-Section on Centre Line of Dam Site
(Looking Downstream)
Scales: Hor. 200 Ft. to an Inch
Ver. 100 " " " "

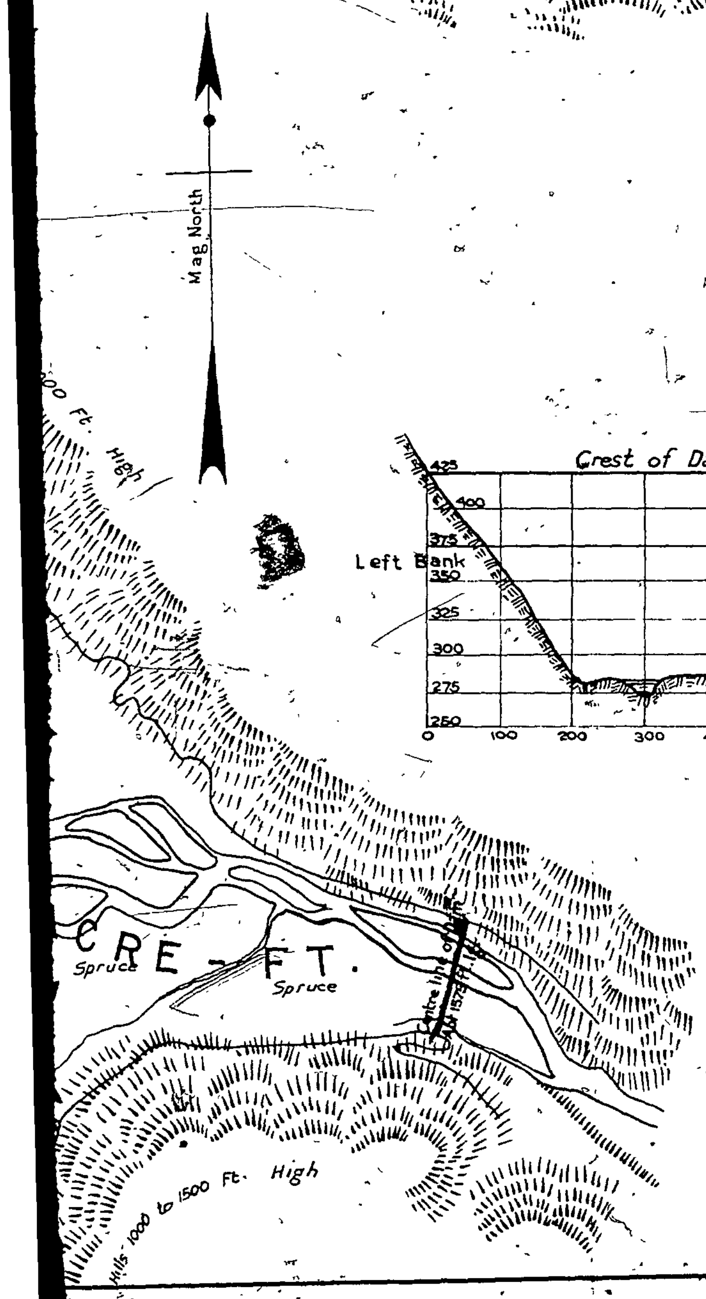


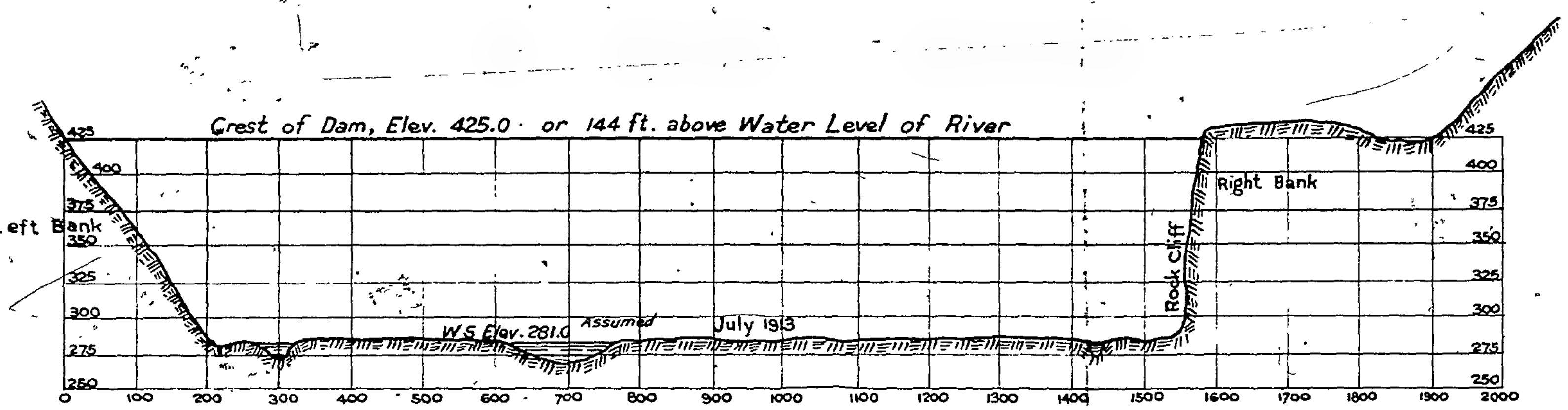


Cross-Section on Centre Line of Dam Site

(Looking Downstream)

SCALES: Hor. 200 Ft to an Inch
Ver. 100 " " " "





Cross-Section on Centre Line of Dam Site

(Looking Downstream)

SCALES: Hor. 200 Ft. to an Inch
Ver. 100 " " " "

Public Works, Canada

NORTH SASKATCHEWAN RIVER SURVEY

PLAN

Showing location of proposed

DAM AND STORAGE RESERVOIR

ON THE

NORTH SASKATCHEWAN RIVER, AT THE GAP

AND

ON THE CLEARWATER RIVER

1913

SCALE: 2000 Feet to an Inch

2 of 2

River where the season's work was commenced.

The triangulation of the Main Channel, which was discontinued at this point in 1913, was carried forward for a distance of 46 miles to the entrance of the Saskatchewan into Cedar Lake, the system being tied to the 14th base line of the Dominion Lands Surveys where this line crosses the River.

From the end of the triangulation, a traverse survey of the South Shore of Cedar Lake was made and continued Easterly for a distance of 61 miles, or as far as Napanee Bay, where work was stopped in 1914. The West shore of Collin's Island, and all of Rabbit Point on the North shore of the Lake, were also traversed, the distance covered being 15 Miles. A total of 76 miles of shore traverse and 46 miles of River triangulation was made during the season.

Stadia surveys were also made of the principal channels into which the river divides below Le Pas, the smaller ones not usually navigated, except by canoes, being neglected.

Two parallel lines of levels were run along the river for the full length of the South shore traverse; Bench Marks being established as before at intervals of approximately one mile. A connection was made with the Levels run over the 14th base line by the Topographical Surveys Branch, Department of the Interior.

Soundings were taken of all River Channels covered by Triangulation and Stadia Surveys, ranges being approximately 500 feet apart and disposed at right angles to the stream.

Cedar Lake was sounded 3 miles out from the entrance of the Saskatchewan River, where a minimum depth of 10 to 12 feet of water was found.

It was considered unnecessary to extend soundings further into the Lake, as the depth increases uniformally in the direction of Rabbit Point, averaging from 30 to 35 feet on the navigation course followed in the wide part of the Lake. Soundings were resumed in the neighbourhood of

Rabbit Point, where shoal waters are again met with. About 2 miles of Lake East of Collin's Island and Rabbit Point were sounded on ranges 500 feet distant before the party was called in.

The season between the middle of May and the middle of July, while the party was located at Cedar Lake, was very favourable for survey work, only 1½ days being lost in two months time on account of rain. The River was also low during the summer, thus permitting of rapid progress being made.

The wind was responsible for some loss of time during the latter part of the season. Considerable difficulty was experienced, especially during the last two weeks, in taking soundings, owing to the smoky condition of the atmosphere, caused by forest fires along the East end of the Lake.

The early Fall, in 1914, was unusually mild, there being practically no frost up to the time the field work ended on October 8th.

The party was brought back to Le Pas by the Ross Navigation Company's S.S. "Brisbane", arriving on the 15th of October, after being "wind bound" three days at High Portage, and further delayed at the entrance to Cedar Lake, and at the first bend of the Saskatchewan above Chemahawin, where the "Brisbane" ran aground. The party was paid off and dispersed the following day.

<u>Method of Traversing.</u> A double set of Chainmen and two Transitmen were used in running the traverse from the East end of Cedar Lake to Lake Winnipeg. Each course was chained over independently by the two sets of Chainmen, the first set carrying a continuous chainage with a 100 foot chain from the starting point, the second set following with a 66 foot chain, the distances in this case being measured from Station to Station only.

Angles were read by the principal Transitman in two positions of the horizontal circle, the second position

being approximately 90° different from the first; as both verniers were read each time, this gave four readings for each angle, the mean of which was adopted. Angles were repeated or doubled by the second Transitman, the values thus obtained being used as a check only. In case of any serious discrepancy, the work was re-checked.

Shore lines and topographical details generally, were filled in by Stadia.

Connections. The Traverse on the North shore of Cedar Lake from Rabbit Point, Easterly, was connected by triangulation to points fixed on Collin's Island by triangulation from the South shore traverse. A tie was made with the 13th Base line where this line crosses at the Western end of the Lake, and another where it cuts through Rabbit Point, about 18½ miles further East.

Description. Between the point where the Survey started in 1914 and Cedar Lake Post (Chemahawin), a distance of 46 Miles, the River follows a sinuous course in a South Easterly direction, through a low flat country filled with Lakes and Sloughs. It varies in width from 200 feet to 1400 feet, the depth ranging anywhere from 6 feet to 28 feet, with the exception of the last 6 or 7 miles above Chemahawin, where the Channel is partly blocked with sand and mud, and a few shallow spots further up River, where there is less than two feet of water at low stages.

The fall in the River between Le Pas and Cedar Lake is very small, averaging only 2/10th. of a foot per mile.

The banks in the upper part of this reach are from 3 to 4 feet high, but gradually become lower further down. At the "Frying Pan" - 62 Miles from Le Pas - a ridge of rock ending on the South shore of the River and rising about 10 feet from the water, marks the last high point above Chemahawin. Below the "Frying-Pan", the banks are less than a foot above summer level, and are entirely covered when the

River is in flood, except possibly at "Brown Rock" where the bank is somewhat higher. The banks are wooded with small Poplar and Willow, the Poplar disappearing 12 miles above Cedar Lake. This bush forms a narrow strip or fringe a few hundred feet wide on both shores; beyond lie meadows or sloughs and large shallow Lakes which in places cover the surrounding Country for miles in all directions.

The first rock was observed on the East shore, opposite Medicine Tent Point, about 22 miles below Le Pas. It consisted of limestone in ledge formation, and outcroped at the "Frying Pan" and at intervals between this point and Cedar Lake.

The principal islands in the Main Channel are known as Ross Island, 22 miles below Le Pas; Hill Islands, a group of Islands 3½ miles long, 12 miles further down; and the two Kettle Islands, which are met with at Mile 60 from Le Pas.

Immediately below Poplar Point, the River divides into three channels flowing to the South; one of these is very wide and shallow and expands into what is known as Mud Lake. About 4 miles above Chemahawin, the river again divides at "Brown Rock", one small channel flowing North Easterly into the North Arm of Cedar Lake, the other from 200 to 350 feet wide, following a Southerly course until it meets with the waters of Mud Lake, one mile above Chemahawin. Swallow Creek is a very narrow channel connecting the first mentioned channel, ¼ mile East of Brown Rock, with the Main River opposite Chemahawin.

At Chemahawin, and for two miles down, the River varies from 800 to 1000 feet in width and 10 to 25 feet in depth. Further down it rapidly widens and becomes very shallow - from 1 to 5 feet deep - as it flows through marshy lands before discharging into the Lake.

A sand and mud flat, covered with 3 to 4 feet of water, extends from the end of the deep channel as far as the

entrance into the Lake, - between Duncan's Island and Oleson's Point, - or for a distance of over 4000 feet. The depth in the Lake increases gradually from this point, being 12 feet, three miles out where soundings were discontinued, and over 35 feet in its deepest part, East of Rabbit Point.

Considerable dredging will be required to secure the desired channel depth where the River enters Cedar Lake. The depth in the upper reach, surveyed in 1914, is sufficient for navigation purposes, with the exception of the 5 or 6 miles immediately above Chemahawin, where a small amount of dredging will be required; and of the small Rapids at Poplar Point and the Frying Pan, where shoals and boulders, with less than two feet of water in its low stages, extend partly across the River.

The Country is not suitable for settlement along this section of River, except at Pine Point, about 52 miles below Le Pas, where a winter trading post is located; and near Cedar Lake, where Cedar Lake Post, established by the Hudson's Bay Company in the early days, has developed into the Indian Village of "Chemahawin". The land everywhere else is too wet and marshy for cultivation, and is completely flooded at high water stages of the River.

Cedar Lake is about 36 miles long and from 15 to 20 miles wide in the main part. It is separated from Lake Winnipegosis to the South by a strip of land from 4 to 6 miles wide, being about 10 feet high at the waters edge, and rising farther back to 90 feet near Lake Winnipegosis. A good team portage, known as "High Portage", crosses this strip at its narrowest point, about mid-way between the East and West shores of Cedar Lake. Mossy Portage, used by canoes only, affords communication between the two Lakes West of High Portage.

The bays on the South side of Cedar Lake are mostly shallow with rock bottom; shores are generally of rock from 10 to 15 feet high, covered in low spots with sand, marsh,

and muskeg patches; they are wooded with spruce, poplar, and scrub of no value except for fuel. Small quantities of amber are found on the beach in a bay about 7 miles from Chemahawin; pieces are smooth and of irregular shape, the larger ones being about ¾ of an inch long. It is more plentiful after a storm from the Eastward, being washed up from the bottom of the Lake.

Cedar Lake and Lake Winnipegosis have practically the same elevation.

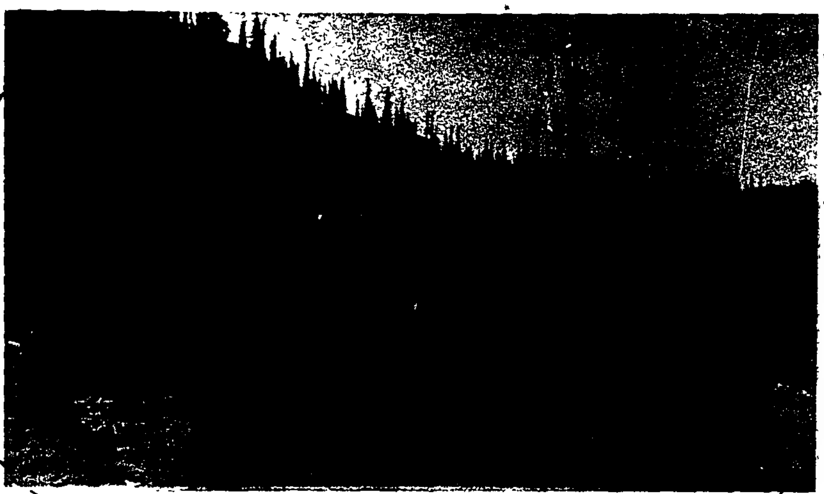
A project to lower the level of Cedar Lake about 11 or 12 feet, by enlarging the outlet into Cross Lake, would, in the event of proving feasible, afford drainage to lands adjacent to the Saskatchewan River, from the Sipanock Channel to Cross Lake, thereby reclaiming a very large tract of country for agricultural purposes. Particulars of this investigation may be found in the Report of Mr. T. H. Dunn, C.E., published in the Annual Report of the Superintendent of Water Powers, Department of the Interior, for the year 1913-14.

Contour Party. Surveys of the River below Prince Albert, having in view the possible improvement of the Cadotte,-Nipawin series of Rapids, and of the Tobin and Squaw Rapids, by means of Locks and Dams, were made by the above party during the latter part of the Season.

During the eight weeks the party was engaged on this work, contours at 8 feet intervals, were carried over a distance of 11 miles of River in the first named series of Rapids, and over an equal distance in the Tobin-Squaw Rapids.

Two possible dam sites were located; the first at Mile 599½, or immediately below the last rapid in the Nipawin Series, where the water may be raised some 63 feet, thereby drowning out these rapids, and the Cadotte Rapids further up River; the second site being at the foot of the Squaw Rapids (Mile 655) where favourable conditions exist for raising the water 68 feet above present level, providing in that manner

Baptiste River Valley, 1914.



The Bighorn River Metering Section
Looking up stream, Sept. 22, 1914.

Metering Section on the Baptiste River.

uninterrupted navigation to the foot of the Nipawin Rapids, 47 miles above.

The development of a large amount of Hydro-Electric power is feasable in connection with such improvements, though owing to River distance from possible markets - Le Pas and the City of Saskatoon being about 100 and 200 miles distant respectively, and no other considerable markets more readily accessible are likely to exist for a number of years to come - as power projects alone, they would be over-expensive and unadvisable at the present time.

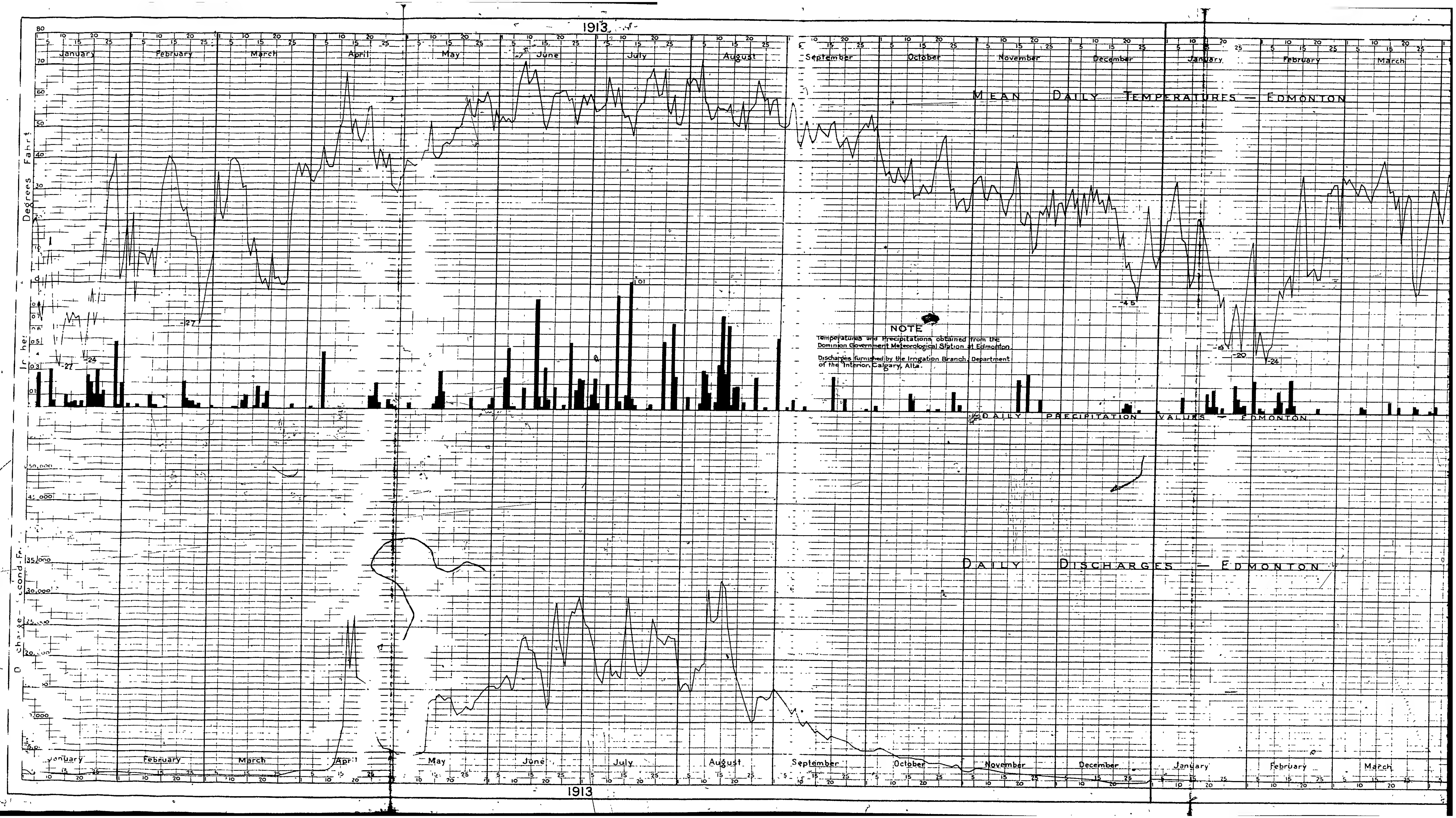
Hydraulic Party. This party was organized at Rocky Mountain House during the latter part of June, and was engaged until the fall in securing discharge measurements of the principal streams in the Saskatchewan watershed West of Edmonton. A pack train of 10 horses served for transportation of outfit, instruments, supplies, etc.

Meterings of the Clearwater and Saskatchewan Rivers near Rocky Mountain House were made, after which the party proceeded to the Brazeau District. The Brazeau, Nordegg, and Baptiste Rivers, were metered, these streams being also examined several miles from their mouth for possible sites for dams and storage reservoirs.

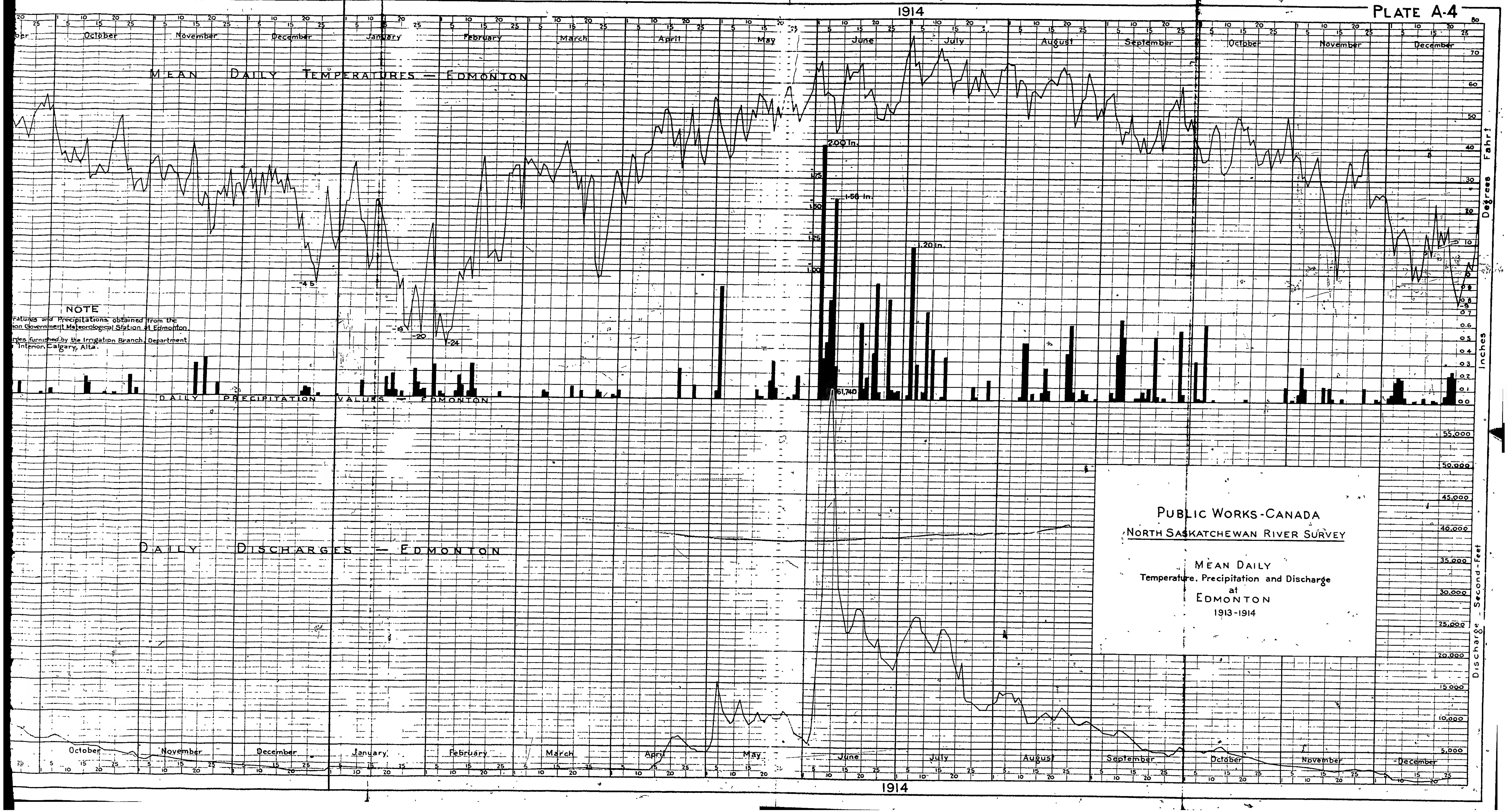
The party returned to Rocky Mountain House the first week in August, and after metering the Clearwater and Saskatchewan Rivers, left for the headwaters of the Saskatchewan, establishing metering sections on the larger tributaries as far as the mouth of the Siffleur River before starting on the return trip.

The Clearwater and Saskatchewan Rivers were again metered after the return of the party to Rocky Mountain House, the second week in October, after which the party was disbanded.

Discharge measurements secured in 1914 are given in Appendix "E" - page 213.



1913
Mean Daily Temperatures — Edmonton
Daily Precipitation Values — Edmonton
Daily Discharges — Edmonton
Degrees Fahr.
Inches
Discharge - Second-Feet
NOTE
Temperatures and Precipitations obtained from the Dominion Government Meteorological Station at Edmonton.
Discharges furnished by the Irrigation Branch, Department of the Interior, Calgary, Alta.
January
February
March
April
May
June
July
August
September
October
November
December


1914
MEAN DAILY TEMPERATURES — EDMONTON
DAILY PRECIPITATION VALUES — EDMONTON
DAILY DISCHARGES — EDMONTON
October
November
December
January
February
March
April
May
June
July
August
September
October
November
December
2.00 In.
1.58 In.
1.20 In.
61,740
-45
-19
-20
-24
Degrees Fahr.
Inches
Discharge — Second-Feet
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
NOTE
...ratures and Precipitations obtained from the ...ion Government Meteorological Station at Edmonton.
...rges furnished by the Irrigation Branch, Department ... Interior, Calgary, Alta.
PUBLIC WORKS-CANADA
NORTH SASKATCHEWAN RIVER SURVEY
MEAN DAILY
Temperature, Precipitation and Discharge
at
EDMONTON
1913-1914

<u>Gauges.</u> Daily readings of water gauges were recorded at the following stations during the season:-

1. Rocky Mountain House, Alta.
2. Edmonton, Alta.
3. Battleford., Sask.
4. Prince Albert, Sask.
5. Le Pas, Man.
6. Chemahawin (Cedar Lake) Man.

The water was at a very low stage in the Saskatchewan in 1914. Gauge readings secured in the late fall served to fix the low water plane in the Section of River between Le Pas and Cedar Lake.

<u>Survey Boat.</u> It was not considered necessary to put the launch "Lafleur" in commission this year, as when needed, tugs of the Ross Navigation Co. of Le Pas were available for visiting and supplying the field party at work below Le Pas.

The launch, however, served as a supply and house boat later in the season, when the Survey of Cedar Lake was under way. She was brought down from Le Pas and anchored in one of the sheltered bays on the South shore of Cedar Lake, being towed from bay to bay, keeping in that manner, within easy reach of Survey camps. She was brought back to Le Pas in the fall and pulled out on shore, where she was laid up for the winter.

<u>Office work.</u> During the winter months the staff was employed in working up the notes of the season's labours in the field. A very large amount of calculations was required in connection with the triangulation and chain traverse before notes could be platted.

Pantagraph reductions of 58 office sheets, covering the Survey of the River from Edmonton to Le Pas, were made. Reduced charts to a scale of 2000 feet to an inch, with profiles, showing present channel and proposed improvements by dredging, were under preparation, but ~~will~~ require several months more work before they can be in condition to be photo-lithographed for publication.

Season 1915.

Field Party. A combined Transit, Level, and Sounding Party of 18 men, was organized at Le Pas early in June, for the Survey of the Eastern portion of Cedar Lake and of the reach of the Lower Saskatchewan River, from Cedar Lake to Lake Winnipeg.

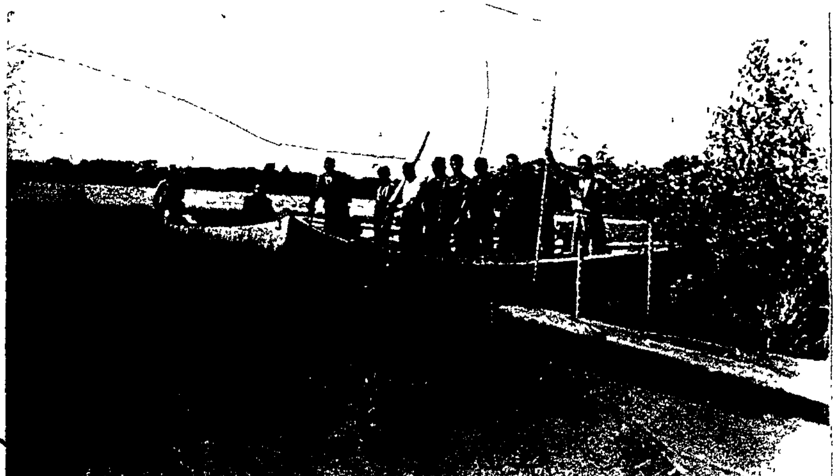
On June 10th, 1915, the Party, accompanied by the Survey Boat "Lafleur", left Le Pas for Cedar Lake, reaching Rabbit Point, where camp was established, late at night the following day.

A stadia survey was made of the North shore of the Lake from Rabbit Point, and continued on the North shore of the River below the Flying Post Rapids, whilst the chain traverse of the South shore was taken up where it was discontinued in 1914, and carried forward to the Western end of the Hudson's Bay Co's. tramway, at the Head of the Grand Rapids. It was considered unnecessary to extend the survey beyond this point, as the remaining Section of River to Lake Winnipeg had been surveyed by the Manitoba Hydrographic Survey in 1912. After connecting the traverse and levels with those of the above named survey, work was brought to a close on October 9th, 1915, and the Party brought back to Le Pas where it was dismissed.

Traversing. About 30 miles of chained traverse were run during the season. Points on the North shore of Cedar Lake, from 2 to 4 miles apart, were fixed by triangulation from the South shore traverse. These served to check the stadia work. The North shore and all islands were traversed by stadia; this work being connected by triangulation to the chained traverse. Two large bays at the eastern end of Cedar Lake and the North and South bays in Cross Lake were triangulated across, instead of carrying the traverse around the shore; this saved considerable time and insured the completion of the survey that season.

A few members of the Survey Party, Grand Rapids, 1915.

Pointers and Canoes at Camp on Willow Island, Cedar Lake, 1915.



Sounding Boat and Beacon Canoe at Camp opposite Anchor Point, 1915.

Levelling. The double line of levels were carried along the South shore, jointly with the chain traverse, as in previous years. Bench Marks were established approximately one mile apart. Levels were carried across O-nah-hap-o-win Bay by sighting from Island to Island, none of the sights being over ½ mile long; the method of reciprocal sights was used in this case, and also in the carrying of levels across a number of smaller bays.

Levels were carried over Cross Lake by water transfer, gauge readings being taken for several days on both sides of the Lake. A check on this work was obtained by connecting with Bench Marks on the 13th Base Line on the East and West sides of the Lake.

Soundings. All of the Eastern part of Cedar Lake was sounded with the exception of the Channel South of Collin's Island, O-nah-hap-o-win Bay, and the bottom of the large bay at the extreme North East end of the Lake. Soundings were taken every 100 feet on parallel ranges about 1000 feet apart. Twelve lines, 1000 feet apart, were sounded between the East and West shores of Cross Lake in the vicinity of the Saskatchewan River.

The River was sounded from Cedar Lake to the Head of Grand Rapids, ranges in this reach being set closer together, or about 500 feet distant, except in Rapids, where it was found necessary ~~to~~ run the Sounding lines down the River instead of across.

Method of Sounding. A sounding rod was used for depths up to 16 feet; for greater depths a 6 pound sounding lead with line was used. The Crew of the Sounding boat consisted of one Sounder, one Recorder, six oarsmen and one steersman. Two canoes, with two men each, were used for moving beacons, and two transitmen, occupying stations on shore, located the position of soundings by intersections on flag in the sounding boat. The boat ran from North beacon to South beacon on one

line, returning in the opposite direction on the next line. Only every fifth sounding was located by intersections, a red flag being used instead of the white flag, to designate such soundings. The number of line sounded, colour of flag, and time of reading on flags, were noted by the Recorder and the two Transitmen on Shore.

Some of the Sounding lines were four miles in length, but under favourable weather conditions, little difficulty was experienced in seeing the flags or in keeping the sounding boat in the line of beacons.

Rabbit Point to The Narrows. At Rabbit Point, Cedar Lake narrows considerably, being only about 6 miles wide opposite that point. Further on, the Lake maintains a fairly uniform width, of from 2½ to 3 miles, to its Eastern extremity. A good channel from 15 to 20 feet deep was found from Rabbit Point to The Narrows. The bottom is rock, everywhere.

The shores in this reach are mostly of limestone in ledge formation, and vary in height from a few feet to twenty feet in places above the water. Where the rock disappears the shores become low and marshy.

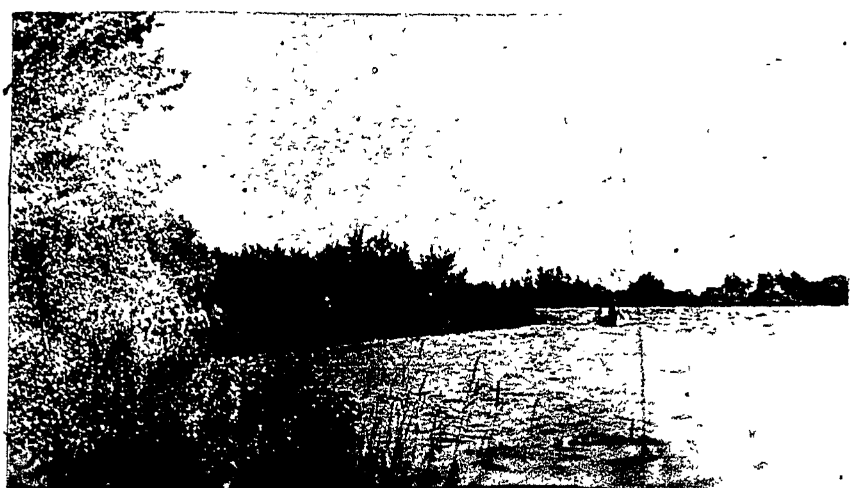
Many Islands are found in this part of the Lake. In general, they are low at the South West end, whilst the North East end is rocky and from 8 to 12 feet high. A thick growth of spruce and poplar covers most of the islands.

Two large bays extend several miles inland from the main shores:- O-nah-hap-e-win Bay on the South shore, West of the Narrows, and a bay - not named - on the North shore at the Eastern end of the Lake.

It may be mentioned here that O-nah-hap-e-win Bay is improperly named Napanee Bay on official Maps. It is known to the inhabitants of Grand Rapids Settlement by the Cree word meaning "the Bay or place where you can see all around".

The Narrows to Cross Lake. "The Narrows" are met with at the Eastern end of Cedar Lake. The name is given to a small

Survey Camp in Portage Bay, below Cross Lake, 1915.



Tracking up the Demie Charge Rapids, 1915.

Tracking up the Red Rock Rapids, 1915.

channel between Moose Island and the South shore, about 100 feet wide, and 6 to 7 feet deep at its entrance, through which part of the waters of Cedar Lake flow swiftly into the Saskatchewan. 200 feet below the entrance, the channel widens gradually becoming very shallow. At the foot of the Island less than three feet of water is found at low stages.

Another channel exists between Moose Island and Sugar Island to the North East. It is considerably wider than the Narrows, and fairly deep part of the way, but is seldom used by navigators, as it shallows rapidly at its lower end, and is considered unsafe except at high water.

The North East or left shore of the River below the Narrows is generally low, being mostly flooded over during high water, whilst the opposite shore is low in places only, high rocky banks prevailing to Cross Lake. There are a number of large bays in this stretch, and a few small Lakes a short distance back from the River.

The Flying Post Rapids occur about three quarters of a mile East of the Narrows. The River here turns due South, and divides at the head of a large Island into two Channels, flowing very swiftly over a bed of solid rock for 5/8ths. of a mile. The fall of the Rapid in this distance is 2.8 feet. Very little water is found in either channel at low stages, the greatest depth being in the Western Channel, but even here in places it is not more than two feet deep.

Below the Rapids, and for 3 miles down, the river is quite wide, and from 7 to 10 feet deep. In this stretch, when a heavy South wind is blowing against the current, the water becomes rougher than in the rapids.

A shoal, having 3 to 4 feet of water over it, extends from Centre Island to the West shore, for one half mile above Anchor Point. The small Rapids opposite this Point, having a fall of 2.2 feet in one quarter of a mile, are caused by this shoal.

From Anchor Point to the Demie Charge Rapids, a distance of three quarters of a mile, the River is from 6 to 9 feet deep in the channel, and one half mile wide. At the Demie Charge, it flows over a rock ridge, dividing into three channels, before discharging into Cross Lake.

The water is very swift in the Main Rapids between Spruce and Calico Islands, the fall being 4 feet in a distance of three eights of a mile. At low stages, there is not more than 3 or 4 feet of water in the rapids. They are not navigable for steamboats except at high water.

For the improvement of the reach from Cedar Lake to Cross Lake, a dam above the Demie Charge Rapids with lock and canal, as shown on sketch plan C-4, is proposed. (See opp. p.73). The new level established by this dam will afford a 10 foot channel for Lake navigation as far up as Le Pas, without materially increasing the dredging necessary for a 6 foot channel, should it be considered advisable to maintain Cedar Lake at its present level.

<u>Cross Lake to Grand Rapids.</u> From the Demie Charge Rapids to the Eastern Shore of Cross Lake, where the Saskatchewan resumes its course towards Lake Winnipeg, the distance is about 6 miles. Deep water, from 15 to 30 feet, was found in the belt, two miles wide, sounded across this part of the Lake.

Leaving Cross Lake, the River expands into a large bay (Portage Bay) to the North, dividing a half mile further down into three channels formed by two Islands. The Cross Lake Rapids occur at this point. The Main Channel in these rapids flows along the South shore of the River, and is over 1200 feet wide, and from 2 to 4 feet deep, whilst the two smaller channels average less than 300 feet in width, and are quite shallow. The fall in the Main Channel is 3.3 feet in a distance of 7/8ths. of a mile.

At ordinary stages, no difficulty is experienced in navigating the Cross Lake Rapids. To render them safely navigable at low water, the deepening of the channel through the limestone ridge, causing these rapids, will be necessary.

The Red Rock Rapids follow one mile below the Cross Lake Rapids, the intervening stretch of River being about 1200 feet in width, and from 10 to 20 feet in depth. The rapids are one mile long, and have a fall of 12.7 feet in that distance. The River bed is solid rock everywhere, strewn with large boulders.

Banks are of clay, 5 to 10 feet high on the North shore, but quite low and rocky on the opposite side of the River. The rock from which the Rapid derives its name, outcrops about midway in the rapids on the South shore, and rises 10 feet above the water.

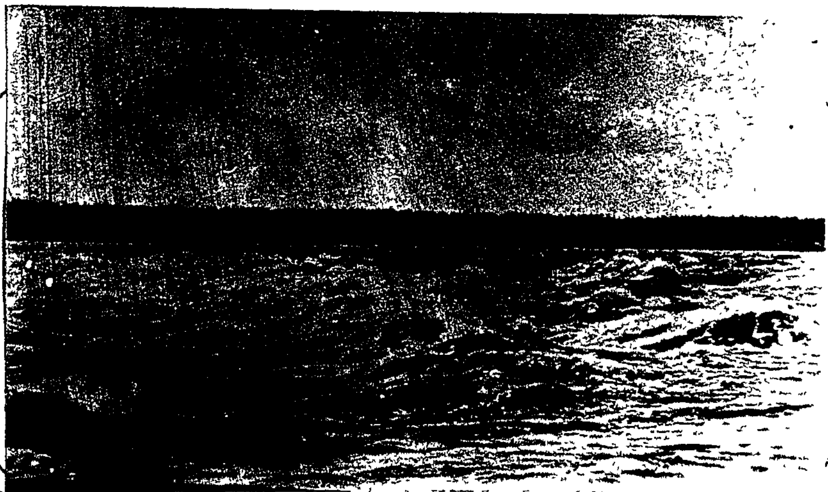
Good water, from 8 to 10 feet deep, is found at the head of the Rapids, and also in the Channel which follows the North shore for a half mile below the head of the rapids; this depth decreases further down to 3 or 4 feet and is maintained to within a short distance of the foot of the rapids.

Navigation is difficult and hazardous in the Red Rock Rapids owing to the very strong current and rocky shoals. It is proposed to improve this reach by means of lockage and canalization, as shown on sketch plan C-5, (See opp. page 75).

A good channel exists from the Red Rock to the Grand Rapids, 4 miles below. The river in this reach varies in width from 800 to 1200 feet and is from 10 to 15 feet deep everywhere, (except immediately below the Red Rock Rapids where the depth is from 6 to 8 feet for about one half mile). The current runs very swiftly in this portion of River. The banks gradually become higher on the way down, reaching a height of 45 to 50 feet in the Grand Rapids. They are for the most part of white clay, but in several places limestone ledges appear.

Sounding in Cedar Lake near "The Narrows" 1915.

End of Hudson Bay Company's Tramway
at the Head of Grand Rapids.



Grand Rapids of the Saskatchewan above the Gorge, 1915.

The small tramway, formerly used by the Hudson's Bay Company for portaging over the Grand Rapids, ends about one half mile from the head of the Rapids. The distances from this point, along the tramway, is about 3½ miles to Grand Rapids Settlement, at the mouth of the Saskatchewan.

The Grand Rapids offer the greatest obstacle to navigation of any of the Rapids in the Saskatchewan River below Edmonton. They fall 70 feet in less than 4 miles, the rough and swift waters flowing over a solid bed of rock strewn with boulders which show above the water in many places.

The two heaviest pitches occur at the head of the rapids. The first pitch which is about 1100 feet long, is followed a third of a mile below by another pitch, 800 feet long, the gradient in both being 40 feet to the mile. Further down, the slope decreases appreciably, being fairly uniform for 3 miles to the foot of the rapids, which point is about two and one half miles from Lake Winnipeg. The upper half of the rapid is from 8 to 10 feet deep, the limestone banks in this portion of the river rising thirty feet high in places. The stream bed narrows from 1300 feet where the rapids begin, to 500 feet below a small island, where the second pitch is encountered. For the next mile or so the river does not exceed 800 feet in width, but becomes quite wide further down, being no less than 2400 feet from shore to shore at the foot of the rapids. The banks in the lower half of the rapids are of white clay, overlaying the rock, and rise from 50 to 60 feet above the water. From 2 to 5 feet of water is the average depth in this reach.

The improvements proposed at Grand Rapids in the interests of navigation, consist of a dam with a series of four locks and canal, the general arrangement of which is shown on sketch plan C-6, attached. (See opposite page 78).

Hydraulic Party. The Survey of possible Dam sites and Storage Reservoirs on the North Saskatchewan River and

tributaries at Head Waters, in connection with the regulation and control of flood waters, on which progress was made in 1912 and 1914, was continued during the season under review.

A party of seven men, consisting of an Hydraulic Engineer, two Recorders, two Axemen, one Packer, and one Cook, with 10 pack horses, left Rocky Mountain House on July 7th for the Baptiste River, arriving at the mouth of that River three days later.

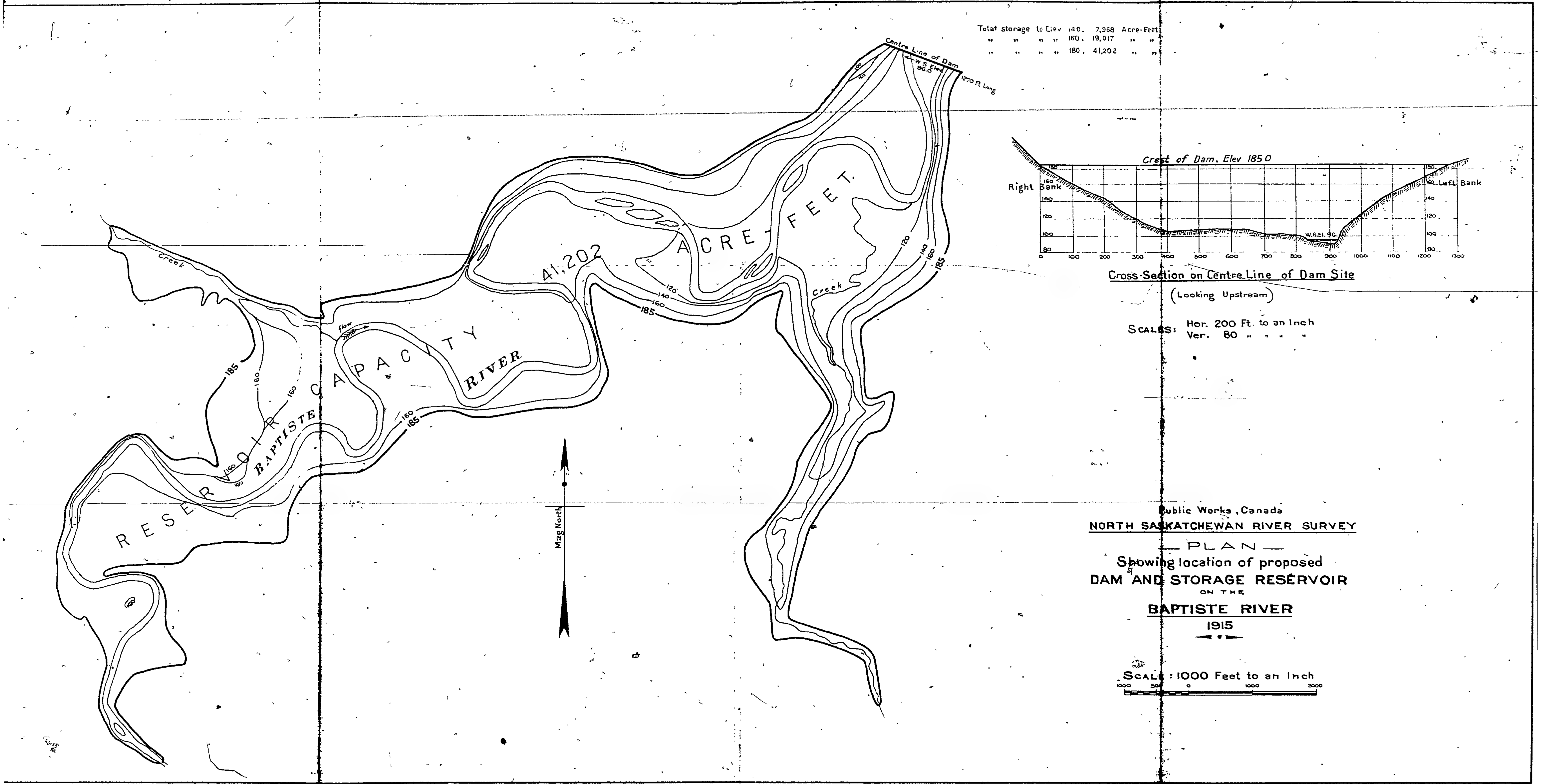
A metering of the Baptiste was made, after which the survey of a Dam site and Reservoir, 3 miles from the mouth of the River, was started. This work lasted until the first week in August.

The site selected is within 14 miles of the nearest wagon road and 32 miles from the Railroad. The stream at this point is 145 feet wide and averages 5 feet in depth. The bed is gravel over clay, but rock probably extends under the clay at no very great depth, as it rises to the top of the bank on the south shore. Banks above the Dam site are of clay with a covering of loam.

Conditions are favourable for the construction of a Dam, about 90 feet in height, at this site. The length of such a dam at Crest Elevation 185, as shown on plate G-2, would be 1270 feet. The reservoir thus formed would provide 41,202 Acre-feet of storage. At Elevation 160, the capacity of the Reservoir would be 19,017 acre-feet. Gravel and sand are available for construction purposes along the river, whilst timber - Jackpine and Spruce - are plentiful on the side hills.

The Party left the Baptiste River on August 9th for the Brazeau, reaching that River on the 13th after cutting several miles of new trail. The Survey of the Brazeau Dam Site occupied the party until September 11th. Results of this survey follow:-

PLATE G-2


Total storage to Elev 140. 7,968 Acre-Feet
" " " " 160. 19,017 " "
" " " " 180. 41,202 " "
Centre Line of Dam
W.S. Elev. 96.0
1270 Ft Long
RESERVOIR CAPACITY 41,202 ACRE-FEET.
BAPTISTE RIVER
Creek
flow
185
160
140
120
Mag North
Crest of Dam, Elev 185.0
Right Bank
Left Bank
W.S.El. 96
Cross-Section on Centre Line of Dam Site
(Looking Upstream)
Scales: Hor. 200 Ft. to an Inch
Ver. 80 " " "
Public Works, Canada
NORTH SASKATCHEWAN RIVER SURVEY
— PLAN —
Showing location of proposed
DAM AND STORAGE RESERVOIR
ON THE
BAPTISTE RIVER
1915
Scale: 1000 Feet to an Inch
1000 500 0 1000 2000

Location of Dam Site:-	Brazeau River, 1400 feet below the mouth of the Nordegg River.
Width of Stream:-	420 feet
Average depth of Stream:-	3.6 feet
Stream bed:-	Gravel and Boulders over clay changing to rock.
North Bank:-	Clay and loose rock between River and steep rock cut bank.
South Bank:-	Loose rock at foot of steep rock cut bank.
Elevation of Crest of Dam:-	200 feet
" of Water Surface:-	100 "
Height of Dam above Water :-	100 "
Length of Dam at Crest:-	721 feet
Storage to Elevation 200:-	44,704 Acre-feet
" " " 180:-	26,212 " "
" " " 160:-	12,950 " "

Gravel and Sand are found at the mouth of the Nordegg River, while Jackpine and Spruce grow to large sizes on the side hills and flats; these are readily accessible for construction purposes. Solid rock most probably exists a few feet beneath the river bed, and if there will afford a stable foundation for a dam of the maximum height.

The Dam site on the Brazeau River is about 65 miles from Rocky Mountain House by the present trail which is travelled by pack trains only. As in the case of works on the Baptiste River, materials and supplies for works on the Brazeau can be hauled from Rocky Mountain House over the river ice during the winter at less expense than either by land or water in the summer months.

Plate G-3 attached, shows the Brazeau-Nordegg Reservoir surveyed in 1915.

The Survey of a dam site and Reservoir at Glacier Lake

Glacier Lake-Oct. 1915.

Falls on Bighorn River-Sept. 7, 1914.

N. Saskatchewan River Valley-Looking down stream from below the Gorge on Windy Point-Sept. 21, 1914.

in the Mountains, was made in the latter part of the season, Glacier Lake being reached on October 5th. After completing this work, the party left on October 20th for Rocky Mountain House, arriving on November 2nd. Men were paid off the following day. The following are the results of this survey:-

Location of Dam Site:-	On Glacier River, 1600 feet from the foot of Glacier Lake.
Width of Stream:-	165.0 feet
Depth of Stream:-	Two or three inches only (nearly dry at this season).
Stream bed:-	Sand, gravel, boulders and rock.
Left Bank:-	Clay, loam, gravelly soil over hardpan and rock.
Elevation of Crest of Dam:-	157.0 feet
" of Water Surface:-	83.0 "
Height of Dam above Water:-	74.0 "
Length of Dam at Crest	617.0 feet
Storage to Elevation 157:-	54,477 Acre-feet.

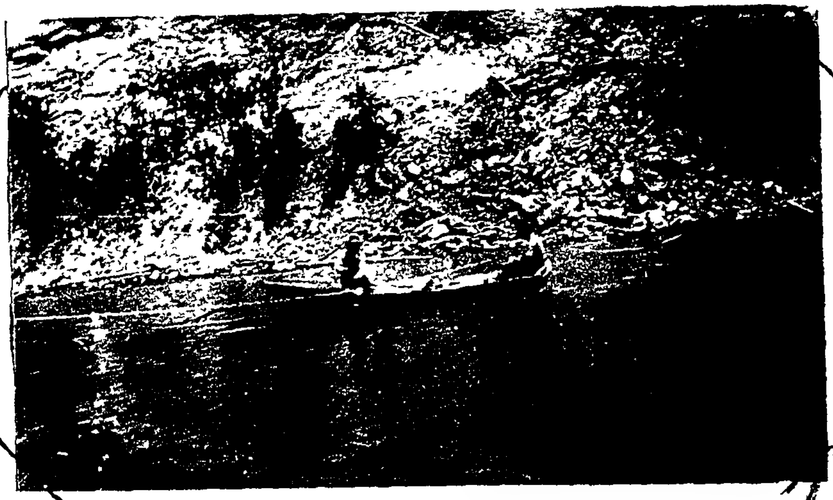
Gravel and Sand for concrete work can be found at the head of Glacier Lake and where Glacier River empties into the Middle Fork. At several points along the River rock cut banks exist, while Jackpine and Spruce may be obtained in sizes up to 20 inches in diameter.

Glacier Lake is about 80 miles by trail from Nordegg, a mining town on the Canadian Northern Railway. The location of Glacier Lake Reservoir is shown on Plate G. A cross section at the site of Dam with area of Reservoir, etc., appears on plate G-3.

Meterings of the Baptiste, Brazeau, and Nordegg Rivers, and of Glacier Creek at the outlet of the Lake, were made during the season while surveying Reservoir sites in the vicinity. Discharges etc., are given in Appendix "E" Page

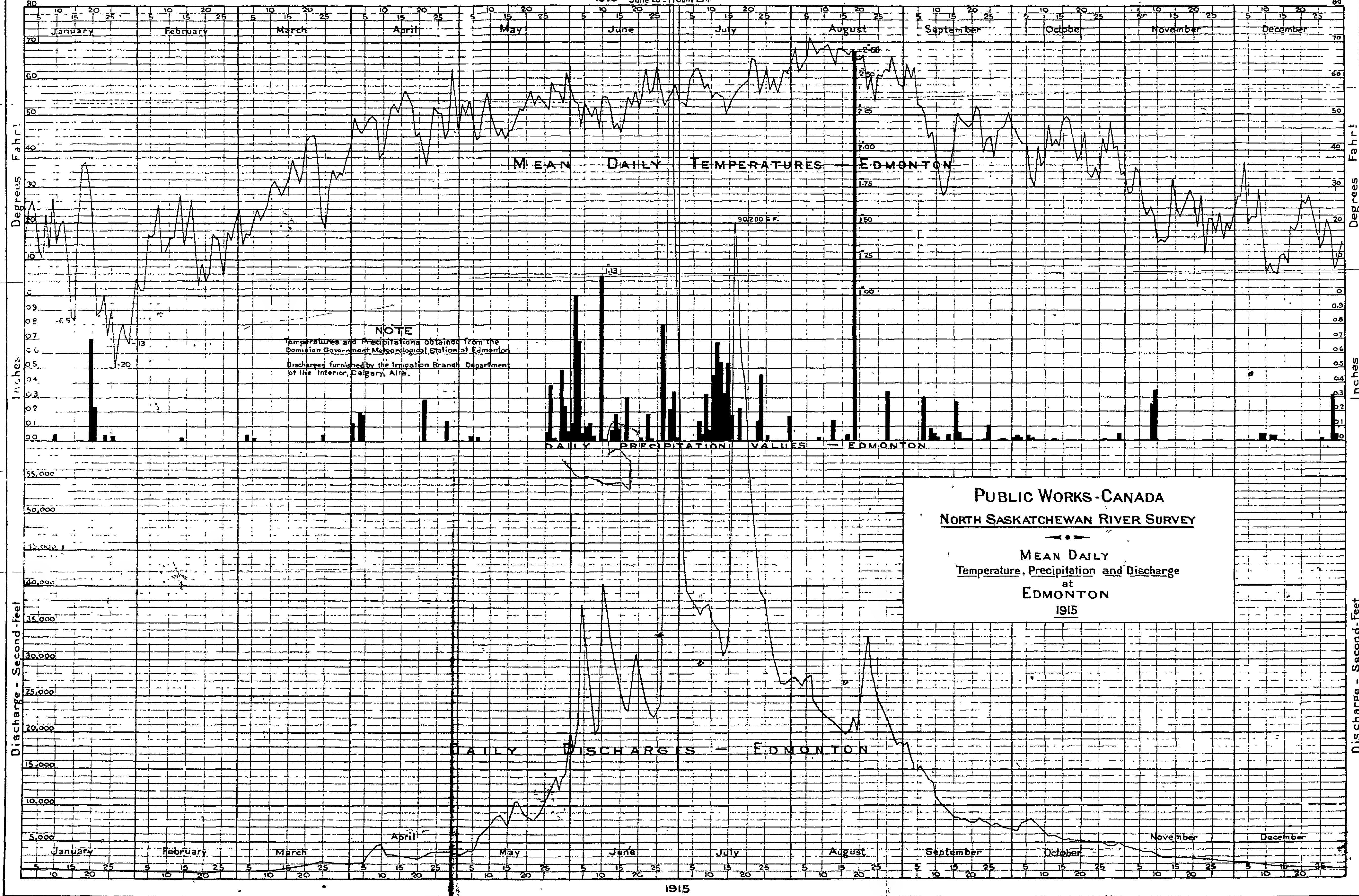
Metering Section on the Brazeau R. above the Nordegg.

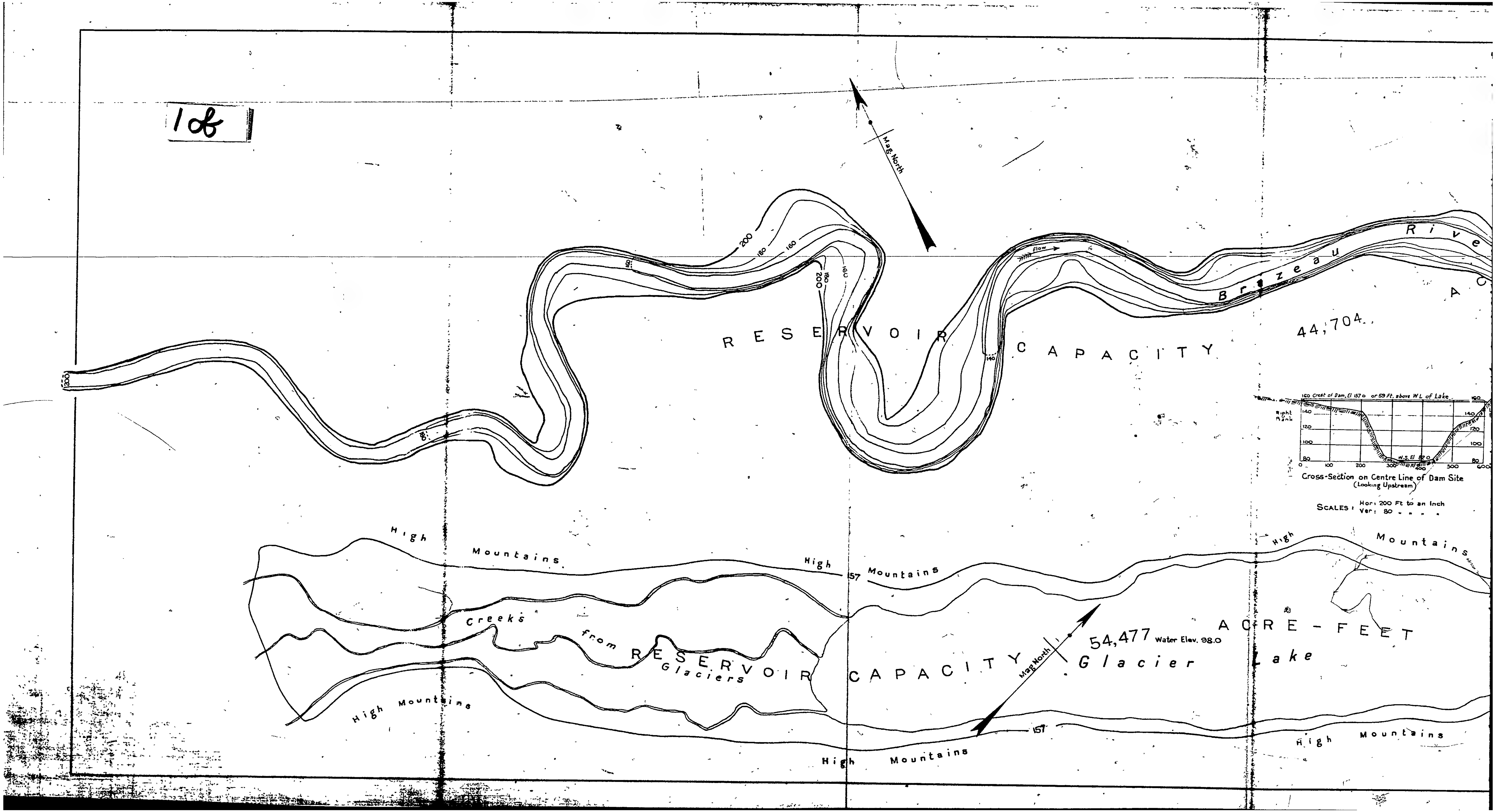
Metering Section on the Brazeau R. below the Nordegg.



Metering the Brazeau below the mouth of the Nordegg.

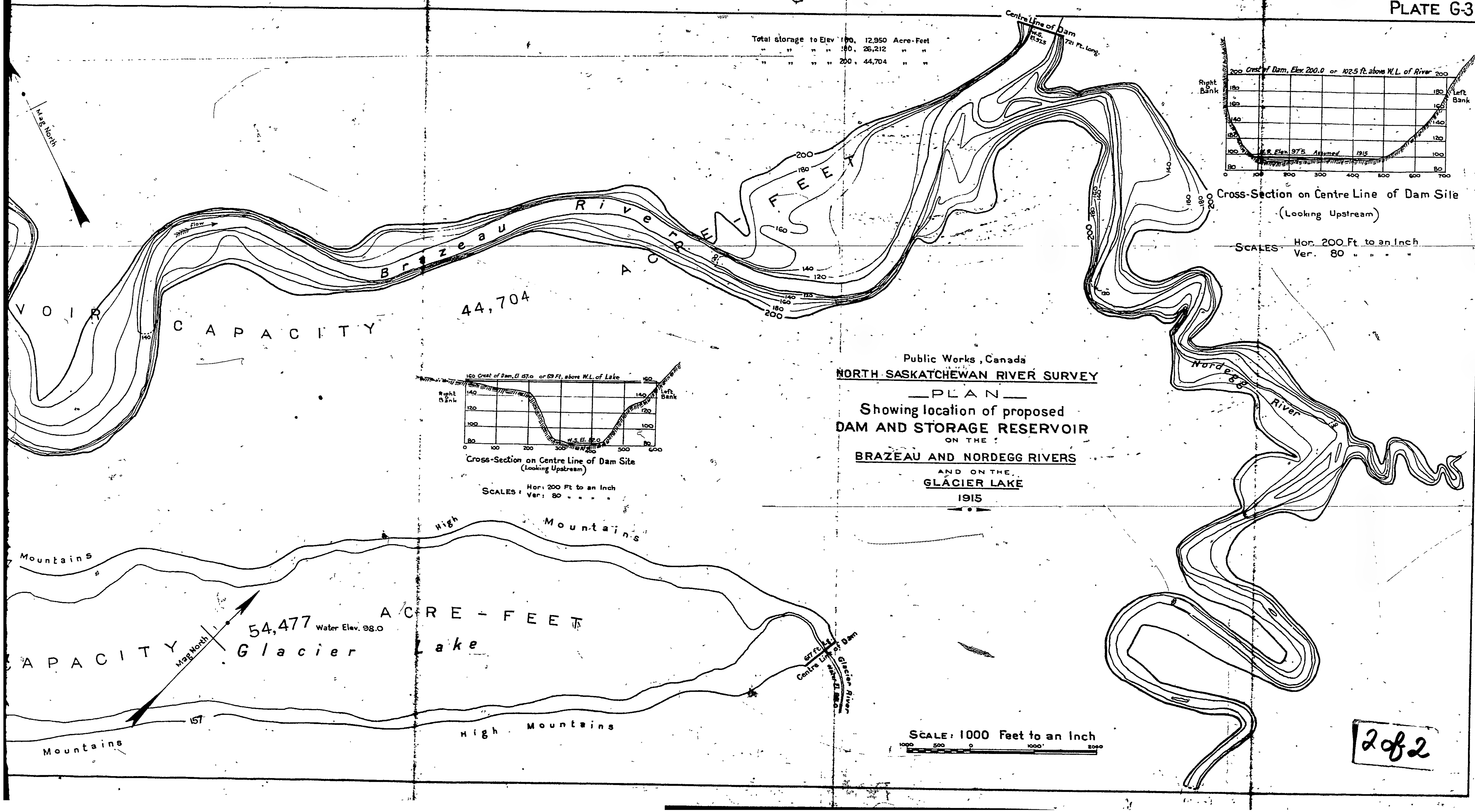
PLATE A-5


PUBLIC WORKS - CANADA
NORTH SASKATCHEWAN RIVER SURVEY
MEAN DAILY
Temperature, Precipitation and Discharge
at
EDMONTON
1915
1915
185,360 S.F. June 28th
173,780 S.F. June 29th
MEAN DAILY TEMPERATURES — EDMONTON
DAILY PRECIPITATION VALUES — EDMONTON
DAILY DISCHARGES — EDMONTON
NOTE
Temperatures and Precipitations obtained from the Dominion Government Meteorological Station at Edmonton
Discharges furnished by the Irrigation Branch Department of the Interior, Calgary, Alta.
Degrees Fahr.
Inches
Discharge - Second-Feet
January
February
March
April
May
June
July
August
September
October
November
December
90,200 S.F.
2.68
1.13
-65
-20
13



1 of
Mag. North
200
180
160
140
Brazeau River
RESERVOIR CAPACITY 44,704.
flow
Right Bank
160 Crest of Dam, El 157.0 or 59 Ft. above W.L. of Lake
W.S. El 82.0
Cross-Section on Centre Line of Dam Site
(Looking Upstream)
SCALES: Hor: 200 Ft to an Inch
Ver: 80 " " " "
High Mountains
High Mountains
157
Creeks from Glaciers
RESERVOIR CAPACITY
Mag North
54,477 Water Elev. 98.0 ACRE-FEET
Glacier Lake
High Mountains
High Mountains
High Mountains
High Mountains

PLATE G-3



Total storage to Elev 160, 12,950 Acre-Feet
" " " " 180, 26,212 " "
" " " " 200, 44,704 " "
Centre Line of Dam
W.S. El. 97.5
721 Ft. long.
Mag North
Flow
Brazeau River
RESERVOIR CAPACITY 44,704 ACRE-FEET
200
180
160
140
120
Cross-Section on Centre Line of Dam Site
(Looking Upstream)
Crest of Dam, Elev. 200.0 or 102.5 ft. above W.L. of River
Right Bank
Left Bank
W.S. Elev. 97.5 Assumed 1915
SCALES Hor. 200 Ft to an Inch
Ver. 80 " " " "
Public Works, Canada
NORTH SASKATCHEWAN RIVER SURVEY
PLAN
Showing location of proposed
DAM AND STORAGE RESERVOIR
ON THE
BRAZEAU AND NORDEGG RIVERS
AND ON THE
GLACIER LAKE
1915
Nordegg River
Cross-Section on Centre Line of Dam Site
(Looking Upstream)
Crest of Dam, El 157.0 or 69 Ft. above W.L. of Lake
Right Bank
Left Bank
W.S. El. 82.0
SCALES: Hor: 200 Ft to an Inch
Ver: 80 " " " "
High Mountains
Mountains
CAPACITY 54,477 Water Elev. 98.0 ACRE-FEET
Glacier Lake
Mag North
157
Centre Line of Dam
677 Ft.
Glacier River
Water El. 98.0
High Mountains
Mountains
SCALE: 1000 Feet to an Inch
1000 500 0 1000' 2000
2 of 2

In addition to the sites on the Clearwater and Saskatchewan Rivers located in 1913, and on the Baptiste, Brazeau, and Glacier Rivers in 1915, a number of favourable locations for dam and reservoirs are known to exist on the North Ram and South Ram Rivers, Wapiati River, South Branch of the Brazeau River, Brazeau Lake, and on the Saskatchewan River below Windy Point. These are shown on Plate G. as also are sites at Mistaya, Pyramid, Lower Waterfowl and Peyto Lakes on the Mistaya River, a preliminary Survey of which was made by the Irrigation Branch of the Dept. of the Interior in 1915.

Further surveys will be required in order to determine the storage capacity of Reservoirs at the above named points. When these surveys have been completed, the possibility of regulating the flow of the Saskatchewan River below Edmonton may be definitely ascertained.

Gauges. Daily readings of water gauges were taken at Edmonton, Prince Albert, Le Pas, and Chemahawin, during the season 1915. Hourly readings of gauges at Edmonton and Prince Albert were taken during the flood of June-July, at which time the water rose to a height slightly above the record flood of August 1899. The maximum discharge of the Saskatchewan on July 2nd, 1915, when the crest of the flood passed Prince Albert, is estimated to have been no less than 200,000 second feet.

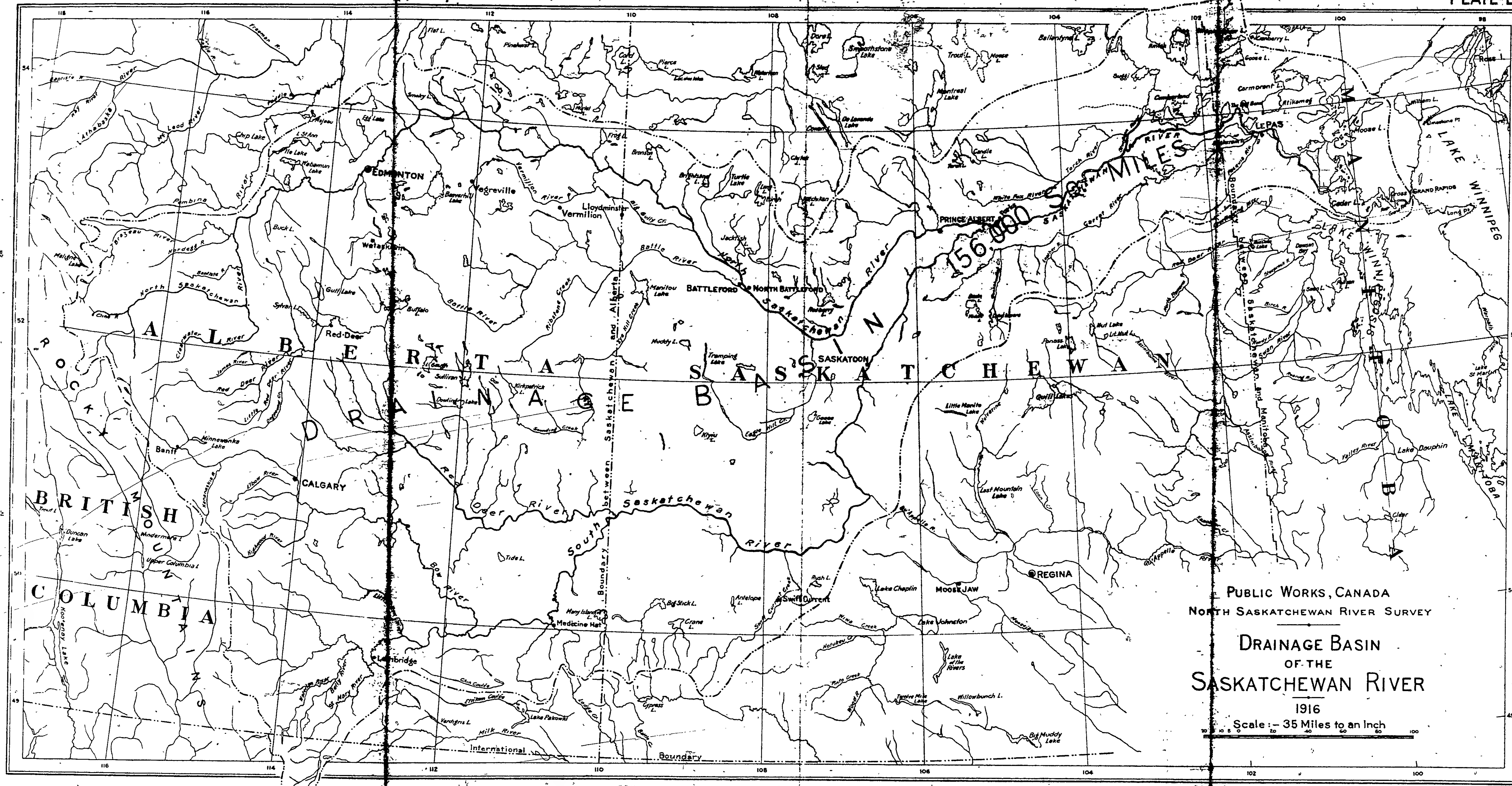
SASKATCHEWAN RIVER

AND

BASIN.

6

PLATE E


PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
DRAINAGE BASIN OF THE SASKATCHEWAN RIVER
1916
Scale:– 35 Miles to an Inch
DRAINAGE BASIN
156,000 SQ. MILES
ALBERTA
SASKATCHEWAN
MANITOBA
BRITISH COLUMBIA
ROCKY MOUNTAINS
EDMONTON
Vegreville
Vermilion
Lloydminster
Wetaskiwin
Red Deer
CALGARY
Banff
Lethbridge
Medicine Hat
BATTLEFORD
NORTH BATTLEFORD
SASKATOON
PRINCE ALBERT
LE PAS
REGINA
MOOSE JAW
Swift Current
North Saskatchewan
South Saskatchewan River
Battle River
Red Deer River
Bow River
Milk River
Saskatchewan River
Carrot River
Torch River
White Fox River
Lake Winnipeg
Lake Winnipegosis
Lake Manitoba
Lake Dolphin
Cedar L.
Grand Rapids
Cumberland L.
Last Mountain Lake
Quill Lakes
Little Manitou Lake
Lake Chaplin
Lake Johnston
Lake of the Rivers
Willowbunch L.
Big Muddy Lake
Lake Pakowki
Chip Lake
Pembina
Sullivan L.
Kirkpatrick L.
Tramping Lake
Manitou Lake
Buffalo L.
Gull Lake
Upper Columbia L.
Windermere L.
Kootenay Lake
Boundary between Saskatchewan and Alberta
Boundary between Saskatchewan and Manitoba
International Boundary

SASKATCHEWAN RIVER AND BASIN

General. The North and South Branches of the Saskatchewan River rise at high elevations on the Eastern slope of the Rocky Mountains in South Western Alberta, the many streams contributing to their flow being fed by the melting snows and glaciers of the Mountain regions.

The North Branch, after leaving the foot hills and receiving the waters of the Clearwater, Brazeau, and other minor tributaries West of Edmonton, and of the Battle River in the prairie districts, flows in an Easterly direction through the great plains of Central Alberta and Saskatchewan, uniting about 840 miles from its source with the South Branch at "The Forks". From this point, it is known as the Saskatchewan River. Flowing through Cumberland, Cedar, and Cross Lakes, on its course towards Lake Winnipeg, the Saskatchewan discharges its waters into Lake Winnipeg at the foot of the Grand Rapids some 410 miles below "The Forks".

The total length of the Saskatchewan, from Headwaters of the North Branch to Lake Winnipeg, is approximately 1,250 miles. The river, as its name implies (Cree:- Swift or Rapid Current) is rapid flowing, the total fall in the 941 miles surveyed, from Edmonton to Lake Winnipeg, amounting to 1292.6 feet, or an average fall of 1.37 feet per mile. Plate B. attached, shows a profile of the River at Low Water stages.

A table, showing the fall of the River per mile in the various reaches, is given in Appendix "E", page

Drainage Basin. The area of the Saskatchewan River drainage basin, as computed from latest official Maps, is approximately 156,000 square miles. The territory comprising this basin, extends from the Eastern slope of the Rocky Mountains for about 750 miles in an Easterly direction to

Lake Winnipeg, and some 400 miles Northerly from the International Boundary, the greater part of Southern Alberta and of Central Saskatchewan lying within the limits of this area. The Basin of the Saskatchewan is shown on Plate E. attached.

Conditions in the North Saskatchewan River Watershed are described, in Appendix No. 4 of the "Report of Hydrometric Surveys (Stream Measurements) for 1915", published by the Irrigation Branch, Dept. of the Interior, Canada, as follows:-

......"The basin naturally divides itself into five parts. "The first or upper part consists of the eastern slope of "the Rocky Mountains. While this part of the basin is not "the largest in area, the greater part of the run-off is "derived from it. In glaciers and perpetual snows of the "higher peaks innumerable small streams rise and flow "eastward, forming large streams which empty into the main "river. These streams are also fed by the melting of heavy "snows and by rains which fall in the mountains at all "seasons of the year. The region, being mountainous, has "a tendency under these conditions to discharge a great "quantity of water into the streams in a short time. This "is seen each spring, as the mountains, being for the most "part bare of vegetation, are exposed to the sun which melts "the winter's snow in a short time. If this warm weather "is accompanied by rain, floods take place. The lower parts "of the mountains and the valleys have a good forest cover "and they alone dampen the effects of warm weather. The "streams in this part have a slope of from 20 to 500 feet per "mile.

"Below the mountain division are the foothills or second "part of the basin. This is the largest in area of the five "parts. Here the river heads northeasterly and is joined by "a great many rivers of various sizes. The valley of the "river becomes better defined and deeper. The country is "hilly and rough but is not as broken as the first part. The

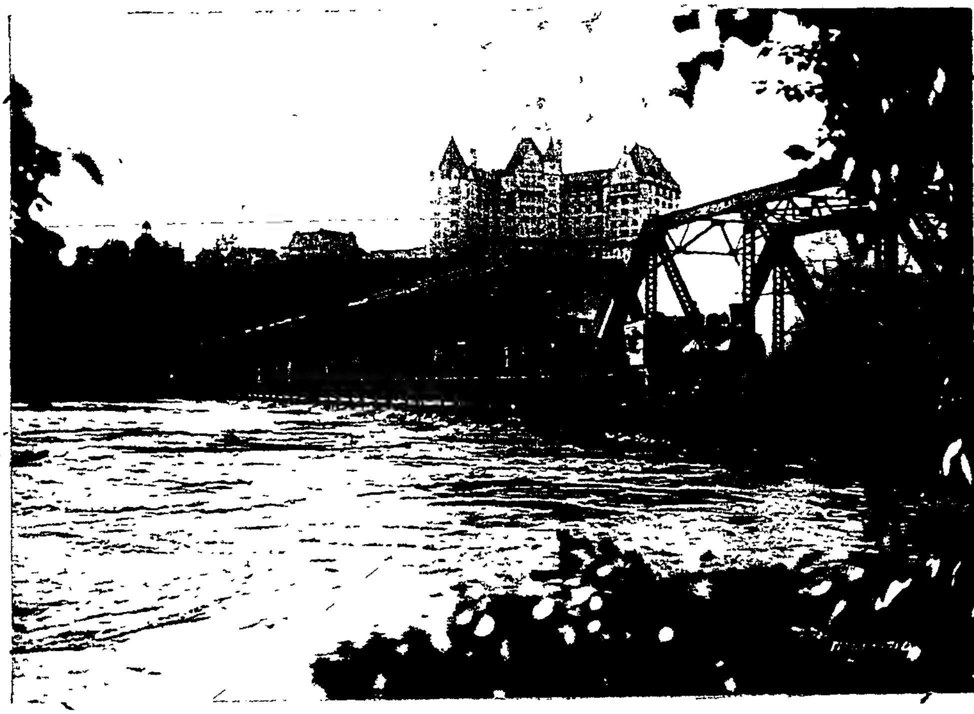
"whole region has a fairly heavy precipitation and is well "covered with forest. Large tracts of muskeg are found in "this region and while to a certain extent they have a "tendency to make the run-off uniform if they become well "saturated, they offer less resistance than bare hillsides "to rapid run-off of heavy rains. The slope of the river "in this section is probably from five to twenty feet per "mile.

"From near Edmonton to the mouth of the Vermilion "River, the North Saskatchewan River flows through a park- "like country with large stretches of prairie. Few "tribuatries flow into the flats along the river. The slope "of this section averages 1½ feet per mile.

"The fourth section, from the Vermilion River to "Prince Albert, is principally prairie with a few stretches "of small timber and second growth. The valley of the river "is much wider and the river itself widens out into shallow "reaches full of shifting sand bars. Low-lying flats border "the river for the greater part of the course. The slope of "this section is less than a foot per mile.

"The fifth and last division is from Prince Albert to "The Forks", or junction with the South Saskatchewan. This "section has a slope of 1½ feet per mile, made up of a "series of rapids. The valley is not as deep as in the two "previous sections, and the river channel is better defined. "The basin is covered with a fair tree growth with very "little prairie land."

Below "The Forks", the River spreads out in broad, swift stretches, with several rapids and many sand bars. The banks are of clay and from 20 to 250 feet high, being cut almost vertically in places. Alluvial flats alternate with the high banks in the first 100 miles. The country further down falls rapidly and becomes flat and marshy, the whole region from the Squaw Rapids to Lake Winnipeg being low lying and filled with Lakes and muskegs.



N. Saskatchewan River. Flood of June-July, 1915.
Low Traffic Bridge at Edmonton, Alta. loaded down
with empty freight cars.

N. Saskatchewan River. Flood of June-July, 1915.
Walter's Mill and Lumber Yards, South Edmonton (Strathcona)

Fairly large timber - Spruce, Jackpine, Birch, and Poplar - suitable for construction purposes, is found along the banks, and on the larger islands in the Saskatchewan, above the Sturgeon River "Cut Off". The lower basin, generally, is lightly wooded, the growth being confined to a narrow strip in the edges of the Rivers and Lakes.

Floods. Like all Mountain Streams, the Saskatchewan is subject to great fluctuations in flow, due to the characteristic conditions prevailing in the upper reaches. Two distinct floods take place each year: the first, usually in April or early May, is of short duration, and in evidence when the freshets from the foothills and western plains come down and carry the ice out of the river. It may be noted that the South Branch of the Saskatchewan River breaks up first in the spring, usually from 8 to 10 days before the North Branch is clear of ice. The second, known as the Summer flood, generally occurs the latter part of June, high water prevailing during July and the first weeks in August. This last flood, when in full force, is by far the heavier and more destructive of the two: to it is attributed the rapid erosion of the banks and constant changing of the channel bed which are characteristic of the river.

Diagrams on plates A-1, A-2, show the heights of the summer floods at various stations where records were kept from 1910 to 1915.

During the period from August to March, the river gradually decreases in volume, the three winter months of January, February, and March being the period of lowest water on account of the frozen condition of the whole drainage basin.

The minimum winter flow at Edmonton may safely be taken at 1,000 cubic feet per second for computing the power producing ability of the River. A maximum discharge of 207,447 c.f.s. was recorded on June 28th, 1915, when the

crest of the worst flood in 50 years passed Edmonton. The Edmonton gauge on that day showed a height of 44.5 ft. above low water.

Navigation. The Saskatchewan River is considered to be a navigable stream throughout its length from Rocky Mountain House, West of Edmonton, to Lake Winnipeg, notwithstanding the many rapids distributed along its course.

In the early days of the Hudson Bay Company, canoes were used for freighting from York Factory, on Hudson's Bay, to the Company's posts in the Interior, the highway of travel being via the Nelson River, Lake Winnipeg, and the Saskatchewan.

In 1825, at a Council meeting held at Norway House and presided by Sir George Simpson, Governor of the Company, a resolution was passed authorizing the building of York Boats for freighting; these were in common use until the advent of steamboat navigation in the late seventies.

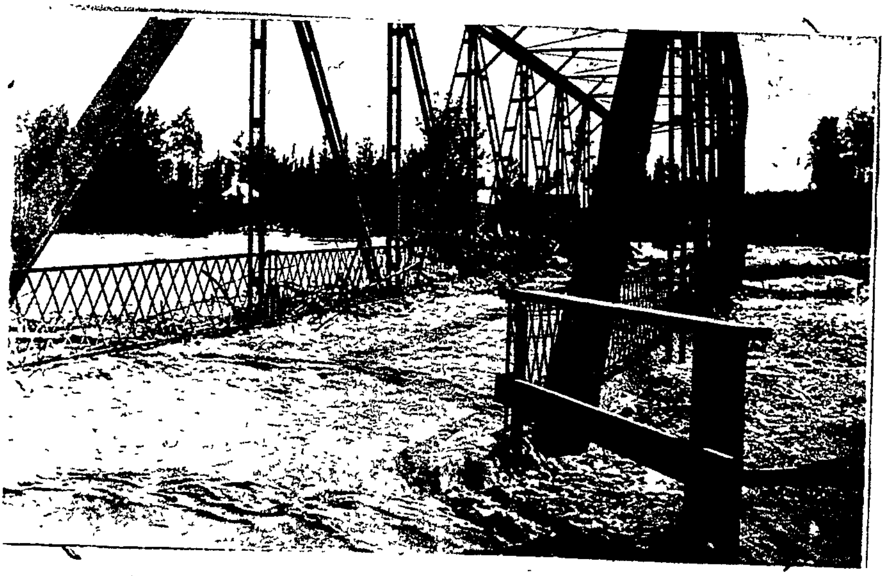
In subsequent years, and until 1910, Steamboats were operated by the Company, from the Head of the Grand Rapids as far up as Edmonton, the custom being to make one or two round trips a year for the purpose of carrying supplies for the posts.

Railroad transportation, however, gradually superceded river traffic in the North West, and in the fall of 1909, the "Saskatchewan", the last of the Company's steamboats navigating between Le Pas and Prince Albert, was laid up at Le Pas, where it has since been dismantled.

The steamboats in use by the Company were stern wheelers, from 100 to 130 feet long over all, and drawing a maximum of 3 feet. By towing two barges, from 90 to 125 tons of freight could be carried each trip.

Several Boats owned by Transportation Companies and private parties were also navigating both Branches of the

N. Saskatchewan River. Flood of June-July, 1915. Debris and wreckage held at Low Traffic Bridge, Edmonton, Alta.



Clearwater River near Rocky Mountain House, Alta. Remaining span of bridge carried away by flood, June and July, 1915.

Saskatchewan River prior to 1910. Two of these boats, the "Northwest" and "Marquis", were 200 feet in length. (See List of Steamers on the Saskatchewan River, Appendix "E", Table XIII.)

Navigation usually opened about the end of May or the first days in June, in the high water period, and continued until the water fell to low level, late in August, and occasionally until the end of September. The long summer days permitted of almost continuous trips being made, the boats tying up only for two or three hours during the night. Return trips from Le Pas to Edmonton (1,600 miles) were frequently made in less than two weeks time under favourable conditions.

At the present time, commercial navigation on the Saskatchewan is confined to the upper reaches in the Edmonton District, and to the lower River, between Cumberland Lake and "The Narrows" in Cedar Lake. Two steamboats - one of which is over 300 gross tonnage - are engaged in passenger and freight traffic at Edmonton, whilst a fleet of steam tugs with barges, and several motor boats, ply on the Lower River and Northern Lakes, making Le Pas their home port.

At Prince Albert, steamboat navigation has practically ceased since 1914, the only boat on the River being used for lumbering purposes in connection with the Saw Mill at that place.

Traffic. Before the advent of Railway Communication in the West, traffic on the Saskatchewan River consisted principally in the hauling of supplies of the Hudson's Bay Company and other Traders to Posts and Settlements established along the River up to the Head of Navigation at Edmonton.

Transportation via the Saskatchewan has steadily decreased during the last thirty years owing to the greater facilities offered by the Railways, and at the present time

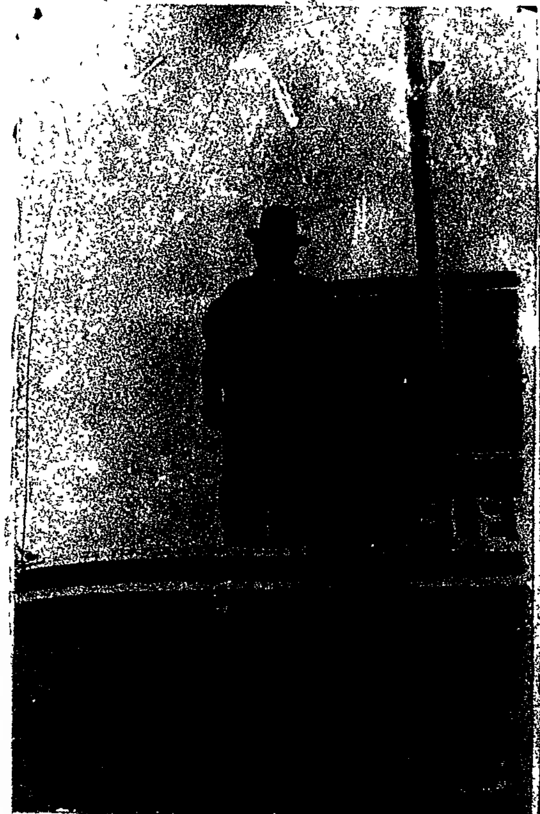
may be said to have entirely ceased, except on the upper River, where steamboats still navigate for about one hundred miles below Edmonton, and on the lower Saskatchewan in the Cumberland, Le Pas, and Cedar Lake Districts.

Water communication if re-established on the Saskatchewan, is expected to develop an important traffic in Coal, Minerals, Lumber, Grain, Live Stock, and Farm Produce, traffic of this nature being principally derived from the adjoining country. The new route will also facilitate the exchange of products and supplies between the Settlements along the River and in the Interior, and the principal Centres at Edmonton, Battleford, Prince Albert and Le Pas. Grain and other commodities loaded on barges and river boats at points on the Saskatchewan, will be hauled by water to Le Pas, and shipped on to the Hudson's Bay Railway from that place to Port Nelson, when destined to European Ports, or transferred to Lake Steamers at Le Pas and shipped through to Winnipeg. The traffic Westward will consist principally in manufactured products, farm implements, Machinery, etc. and generally in such classes of heavy freight as can be more readily and economically transported by water than by rail.

IMPROVEMENTS

AND

ESTIMATES.



Pilot Moise Sahys of the "Lafleur"
1915.

H.B.Co's. Tramway over Grand Rapids,
1915.

Sturgeon - Cedar Lake, 1915.

IMPROVEMENTS AND ESTIMATES.

Character of Improvements. The establishment of a navigable waterway for light draught vessels on the Saskatchewan River, from Edmonton to Lake Winnipeg, in accordance with the project herewith submitted, will necessitate the carrying out of the following works:-

(1) The deepening of the present channel in places, by Dredging, and the removal of boulders in Rapids;

(2) The building of Diversion and Bank Protection Works in reaches where sand bars predominate; and

(3) The Construction of Locks, Dams, and Canals at points where rapids cannot be made navigable otherwise.

Dredging.

Quantities and Cost. A total of 19,183,374 cubic yards of material will require to be removed from the river bed, by dredging, to secure the desired depth and width of channel from Edmonton to Lake Winnipeg. The estimated cost of this work amounts to $4,839,597.00, representing an average cost of about $5,143.00 per Mile for the 941 miles of river to be made navigable.

Plates 1 to 59 show, in red colour, the sections of the channel to be dredged. The estimated quantites, with area of cut, and classification of material, are given in Table VII, Appendix "E", for each mile of River, where dredging is required. A summary of the total cost of dredging the eight reaches into which the river is divided for this work, appears on the following page.

Channel Width and Depth. For the requirements of shallow draught navigation that is likely to develop between

NORTH SASKATCHEWAN RIVER SURVEY.

DREDGING SUMMARY.

Channel (Edmonton to Le Pas, 150 Ft. wide, 6 Ft. deep
(Le Pas to Lake Winnipeg, 150' " 10 " "

REACH	LENGTH MILES	MATERIAL	QUANTITIES CUBIC YARDS	PRICE	COST	REMARKS
Edmonton To Pakan	77.	Boulders & Rocks Stones, Gravel & Clay Mud & Sand	106,900 3,267,150 23,200	$1.25 .30 .10 Total	133,625.00 980,145.00 2,320.00 $1,116,090.00	Pointe-aux-Pins, Vermilion & Sucker Rapids in this reach. Average cost for reach:- $14,500.00 per mile.
Pakan To Vermilion River	118.	Boulders & Rocks Stones, Gravel & Clay Mud & Sand	104,850 2,620,600 431,850	$1.25 .30 .10 Total	131,062.50 786,180.00 43,185.00 $ 960,427.50	Eight series of Rapids in this reach. Average cost for reach:- $ 8,140.00 per mile.
Vermilion River To Battleford	134.	Boulders & Rocks Stones, Gravel & Clay Mud & Sand	450 726,100 4,037,050	$1.25 .30 .10 Total	562.50 217,830.00 403,705.00 $ 622,097.50	No rapids in this reach. Average cost for reach:- $ 4,640.00 per mile.
Battleford To Prince Albert	164.	Boulders & Rocks Stones, Gravel & Clay Mud & Sand	10,200 727,300 2,383,350	$1.25 .30 .10 Total	12,750.00 218,190.00 238,335.00 $ 469,275.00	No rapids in this reach. Average cost for reach:-. $ 2,860.00 per mile.
Prince Albert To Cut Off (Sturgeon River)	178.	Boulders & Rocks Stones, Gravel & Clay Mud & Sand	127,552 797,419 502,473	$1.25 .30 .10 Total	159,440.00 239,225.70 50,247.30 $ 448,913.00	La Colle Falls, Cadotte, Nipawin Tobin & Squaw Rapids in Reach. Average cost for reach:- $ 2,522.00 per mile.
Cut Off To Le Pas	130.	Mud & Sand	2,855,150	.10	$ 285,515.00	Dredging at Cut Off to divert River into Old Bend and 50% of estimated quantities for Old Saskatchewan. Average cost per mile $2,200.00
Le Pas To Cedar Lake (Duncan Island)	79.	Solid Rock Stones & Clay Mud & Sand	46,900 145,400 18,200	$3.00 .30 .10 Total	140,700.00 43,620.00 1,820.00 $ 186,140.00	For 10 ft. navigation from Le Pas to Lake Winnipeg. Average cost per mile $2,360.00
Cedar Lake To Lake Winnipeg	61.	Solid Rock Stones, Gravel & Clay	250,280 1,000	$3.00 .30 Total	750,840.00 300.00 $ 751,140.00	Channel, Canal & Lock Excavations at Demiecharge, Red Rock & Grand Rapids are given on separate Estimate Sheets. Average cost per mile $12,300.00

Total cost of Dredging, Edmonton to Prince Albert .... $3,167,889.00 - about $6,425.00 per mile.

" " " " Prince Albert to Le Pas .... $ 734,428.00 - " $2,385.00 " "

" " " " 6 Foot Channel from Edmonton to Le Pas $3,902,317.00

Dredging, Le Pas to Lake Winnipeg - 10 Foot Channel 937,280.00

TOTAL COST DREDGING, EDMONTON TO LAKE WINNIPEG $4,839,597.00

DISTANCE, EDMONTON TO LAKE WINNIPEG ... 941 Miles.

AVERAGE COST DREDGING PER MILE .... About-$5,143.00

Edmonton and Le Pas, following the completion of the proposed waterway, a channel 150 feet in width and 6 feet deep at low water is sufficient and has been provided for in the estimate. For the remaining reach to Lake Winnipeg, the estimate is based on a channel of equal width but 10 feet deep.

The proposed waterway above Le Pas will accommodate steamboats of the sternwheeler type, 200 feet long, and drawing from 3 to 4 feet of water when loaded, the channel width provided allowing ample room for the passage of boats travelling in opposite directions. Below Le Pas, a 10 foot depth of channel will permit Lake vessels to navigate Cedar and Cross Lakes at all times, flat bottom boats and barges being unsafe on these waters during stormy weather.

Material. The material to be dredged consists chiefly of mud, clay, sand, and gravel, and can be most economically disposed of by the use of self-propelling combination Dipper and Hydraulic Dredges especially designed for this class of work. For the removal of rocks and boulders in the Rapids, clamshell or orange peel dredges will be required.

The percentage of the different materials to be removed by dredging, as classified in Table VII. follows:-

Mud and Sand	53.4%
Stones, Gravel and Clay	43.2%
Boulders and Rocks	1.8%
Solid Rock	1.6%
TOTAL	100.0%

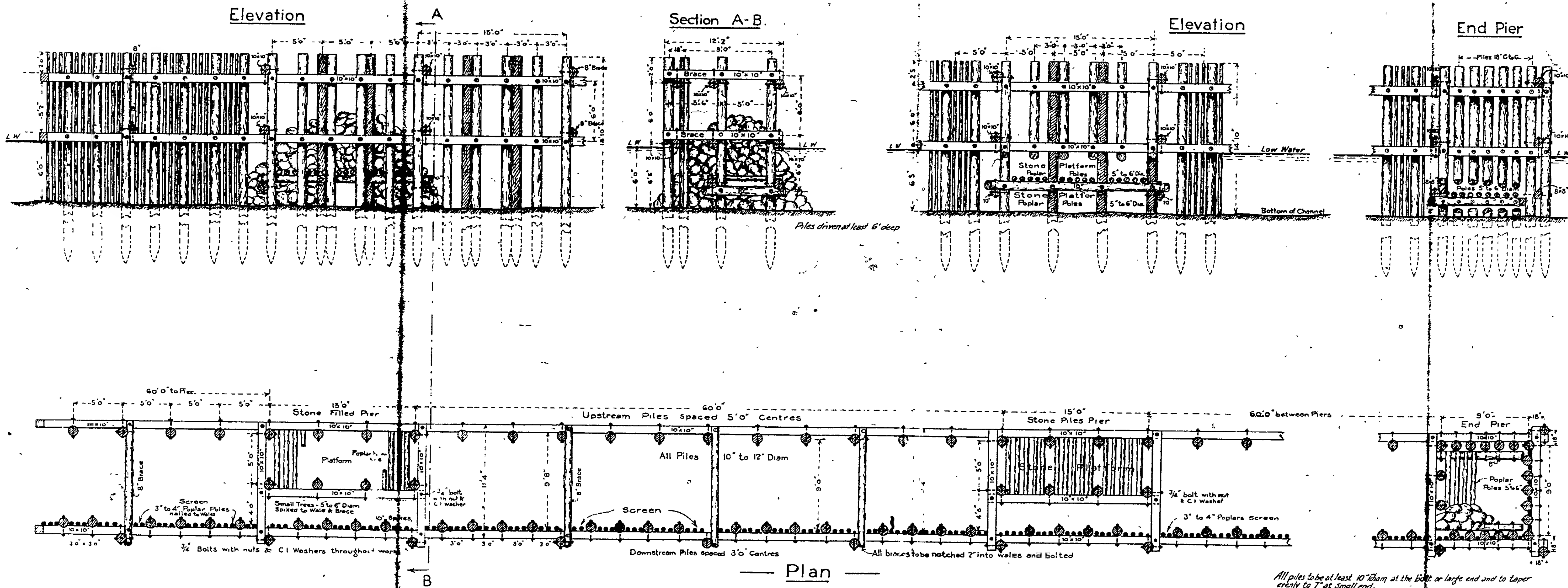
It is expected that dredging improvements will, to a large extent, be permanent, once the control of spring and summer floods has been accomplished. The removal of shallow spots in the present channel, and the straightening of the channel by cutting through low bars, will, by increasing the velocity of the current at such points, cause the scouring of the bottom and thereby prevent sediment accumulating.

PUBLIC WORKS, CANADA

NORTH SASKATCHEWAN RIVER IMPROVEMENTS

Typical Diversion and Bank Protection Works.

Scale: – 1/8 th Inch = 1 Foot



All piles to be at least 10" Diam at the butt or large end and to taper evenly to 7" at Small end.
All wales & Cross braces to notched 2" into piles
Wales to be 30ft long. ¾" Iron bolts with nuts & Cast Iron Washers to be used throughout Works

Diversion and Bank Protection Works.

Sites. Works of this nature are proposed in places where the deep water channel crosses from one side to the opposite side of the river; where the presence of shifting sand bars is responsible for constant changes in the river bed; and where islands divide the flow into several channels. They will be located mainly in the reach from the Vermilion River to Prince Albert in which section these conditions mostly prevail.

Description. A typical design of Diversion Works proposed, is shown on Plate "F". The following is a brief description of same:-

Two parallel rows of heavy piling, 9 feet apart, with piles spaced 5 feet centres on the upstream side, and 3 feet centres on the downstream side, are braced every 15 feet, the piling being held by securely bolted top and bottom wales. Piers, weighed down with stone resting on a platform, are placed within the piling every 60 feet. End piers are reinforced with extra piling, as also are the piers marking the change of alignment of each section of the dyke. Poplar poles, 3 to 4 inches in diameter, are nailed to the downstream wales, to form a screen, the purpose of which is to retard the flow, and to cause sedimentation below the works.

Effect of Dykes. By disposing works of the type described, at a proper angle with the direction of the current, a large percentage of the silt and sand carried by the spring and summer freshets will deposit in the pools downstream, forming bars, which, in time, will extend to the shores, and prevent, to a large extent, the destruction of banks by erosion. The compact dyke, formed by the accumulation of silt and debris within the piling, will divert and increase the flow in a fixed direction, and close minor channels between islands, where these are found necessary.

Works as designed are intended to be permanent. They will be safe against the excessive strains due to ice shoves or driftwood fields, on account of being submerged when the spring and summer floods take place.

Location and Cost. Locations of proposed Dykes are shown in red on Charts of the River (Plates 1 to 59). The sites, however, are subject to revision owing to changes that have taken place in the river bed following the very heavy flood of 1915.

The total estimated cost of Diversion Works, based on the number and lengths of dykes required at the time the Survey was made, amounts to approximately $1,360,674.00. No less than 108 separate dykes having a total length of 142,800 feet, or over 27 miles, are provided for in the above Estimate.

The detailed Estimate on page 64, shows the Cost of such works to be about $9.26 per lineal foot. A list giving the location, length, and cost of each work, appears on page 65, and following.

Dams, Locks and Canals.

Cost. For the permanent improvement of six of the series of Rapids between Prince Albert and Lake Winnipeg, the construction of Dams, Locks, and Canals is proposed, which will involve a total expenditure of approximately $14,565,320.00

The general arrangement of structures at La Colle Falls, The Forks, the Tobin and Squaw Rapids, the Demie Charge Rapids, the Red Rock Rapids, and the Grand Rapids, is shown on Plates C-1 to C-6. Details are omitted, as new surveys with contours, test borings, etc., will be required at a later date when the final plans are being prepared. Preliminary plans, however, show the best means of safeguarding navigation and power interests where improvements are contemplated, and will be found ample for the purpose intended, i.e., for an approximate

estimate of the cost of permanent works at the above named Rapids.

<u>Dimensions of Locks-Construction.</u> A minimum length of 250 feet between inside gates, and a width of 50 feet clear between lock walls, is proposed for all lift locks in the river, and the [illegible] of water over mitre sills is to be in every case not less than 10 feet at low water.

All Locks are to be of concrete construction, of standard design, and equipped with modern appliances for their operation. Approach piers of suitable length, constructed of critwork underwater, and topped with concrete walls rising 3 to 4 feet above high water.

<u>Type of Dams.</u> Hollow concrete dams of the Ambursen type are proposed at all sites, except at the Demie Charge Rapids, where a stop-log dam, similar to the Chaudiere Dam at Ottawa, is contemplated. Proposed dams at La Colle Falls, The Forks, and the Squaw Rapids, will rest on a <u>hard pan</u> foundation, rock being at an unknown depth in these localities. The Demie Charge and Grand Rapids dams will be insured of a secure foundation, on account of rock being accessible at no considerable depth.

<u>Canals. Width etc.</u> A bottom width of 100 feet is provided for in all canals. Wherever practicable, banks will have side slopes of 1½ horizontal to 1 vertical; but wherever rock is encountered, the side walls will be cut vertically. The finished depth will be 6 feet in the canals of the upper river, and 10 feet in those of the Lower Saskatchewan.

Canals in the upper river will be excavated in alluvial soil, rock showing nowhere in the surrounding region. At the Demie Charge, Red Rock and Grand Rapids site, excavation will be entirely in solid rock. (limestone) overlaid in places with shale and light soil.

NORTH SASKATCHEWAN RIVER IMPROVEMENTS

TYPICAL DIVERSION & BANK PROTECTION WORKS

ESTIMATE FOR SECTION 309 FEET LONG

BILL OF TIMBER

208 Piles 25' long = 5200 Lin.Ft. @ .20¢	$1040.00
208 Piles @ .50¢ per pile driven	104.00
10 Cross Braces 10"x10"x26' -- 2165' B.M.@ $35.00	
41 Wales 10"x10"x30' -- 10250' "	
3 " 10"x10"x18' for piers- 450' "	
12865' " @ $35.00	450.27
24 Cross Braces 10"dia. 12'.3" - 294 L.Ft.@ 20¢	58.80
4 Wales 8"dia. 9' long - 36 L.Ft.@ 20¢	7.20
16 Pieces 6"dia. 8' long - 128 L.Ft.@ 20¢	25.60
2 Braces 8"x8"x26' - 52 = 277 Ft.B.M.@ $35.00	9.69
6 Wales 10" dia. 18' long = 108' @ 20¢	21.60
6 Cross Braces 10"dia. 9' long = 54' @ 20¢	10.80
45 Pieces Ballast Floor 6" dia. 8' long = 360' @ .05¢	18.00
369 Pieces Screens 4" dia. 15' long - 5535' @ .05¢	276.75
	$2022.71

STONE FILLING

54 Cords Stones @ $6.00	$ 324.00

BILL OF IRON

60 Bolts ¾"dia.21" long U.H. - 165 lbs.	
548 " ¾" " 23" " " 1644 "	
22 " ¾" " 29" " " 81 " 1890# @ 6¢	113.40
630 Nuts ¼ lb. each - 157 lbs. @ 10¢	15.70
1260 C.I.Washers 1461 " @ .7¢	102.27
570 Wire Spikes 114 " @ 6¢	6.84
	$ 238.21

MATERIAL	$2584.92
LABOUR	276.78
TOTAL COST ..	$2861.70

$\frac{2861.70}{309}$ = $9.26 per Lin.Ft.

NORTH SASKATCHEWAN RIVER IMPROVEMENTS

LIST OF DIVERSION AND BANK PROTECTION WORKS

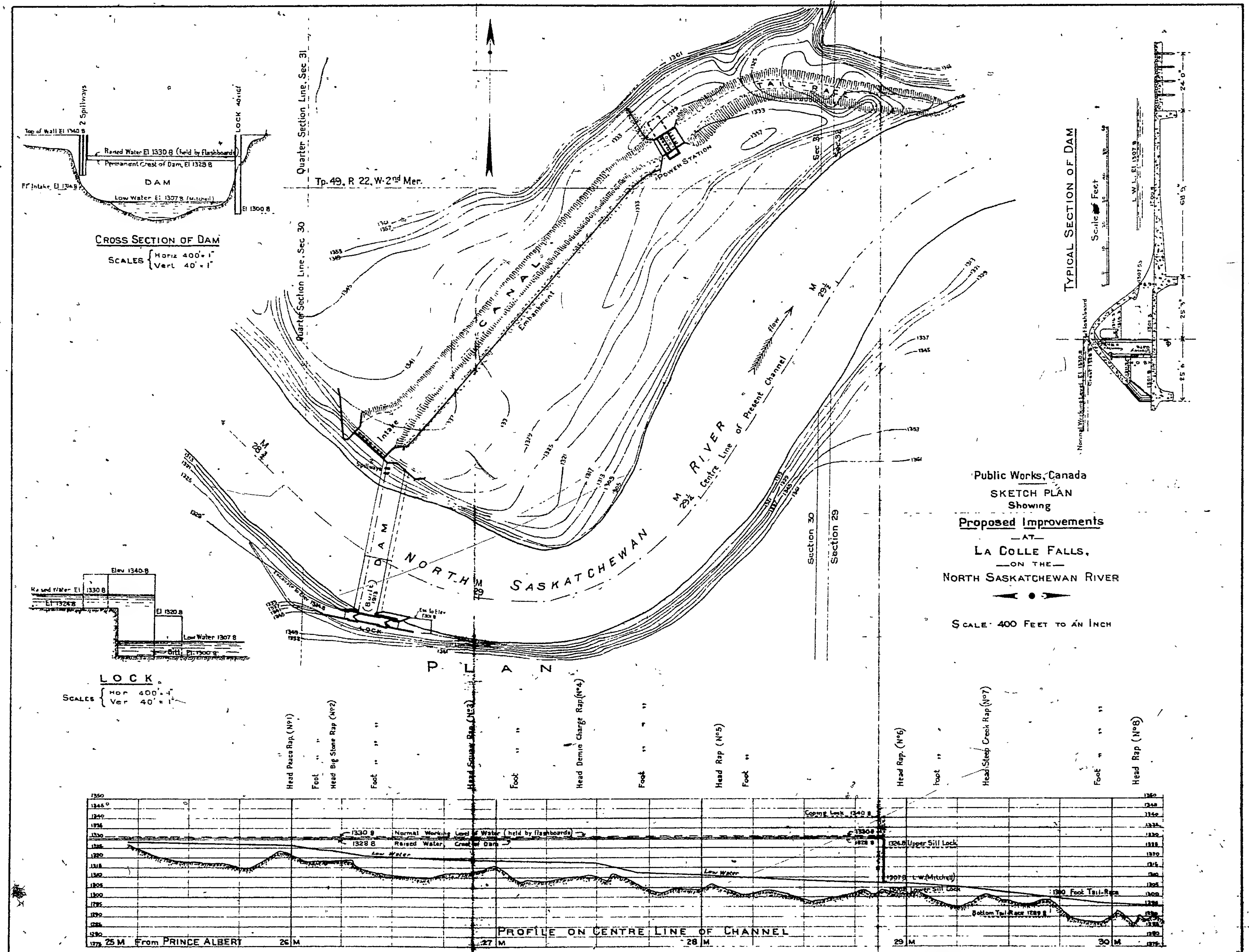
NO.	MILES FROM EDMONTON	LENGTH OF WORKS	ESTIMATED COST	REMARKS
1	22¼	1000'	$ 9,555.00	
2	44½	500	4,630.00	
3	117¼	500	4,925.00	
4	140	1200	11,407.00	
5	147¾	1400	13,554.00	
6	177	1000	9,260.00	
7	179½	900	8,334.00	
8	199½	2600	24,961.00	
9	203¼	1300	12,333.00	
10	205	2000	19,110.00	
11	207	1300	12,333.00	
12	208½	1300	12,628.00	
13	209½	1400	13,554.00	
14	210¼	1600	15,111.00	
15	213½	2500	24,035.00	
16	214¼	1500	14,480.00	
17	217¾	1600	15,111.00	
18	219½	2800	26,515.00	
19	221¾	1400	13,554.00	
20	223	700	6,482.00	
21	237½	2000	19,110.00	
22	239	1600	15,406.00	
23	241¾	1100	10,776.00	
24	243¼	1900	18,184.00	
25	244	1500	14,185.00	
26	245	1500	14,185.00	
27	248	2000	19,110.00	
28	249	1000	9,555.00	
		41100'	$392,386.00	

NO.	MILES FROM EDMONTON	LENGTH OF WORKS	ESTIMATED COST	REMARKS
		41100'	$ 392,386.00	
29	249½	800	8,003.00	
30	251	1600	15,406.00	
31	252½	1400	13,259.00	
32	256¼	1800	17,258.00	
33	258	2100	20,036.00	
34	259½	1400	13,259.00	
35	261¼	1400	13,554.00	
36	262¾	1100	10,766.00	
37	265¼	1200	11,407.00	
38	267½	1000	9,260.00	
39	268¼	2000	18,815.00	
40	271	1100	10,766.00	
41	271¾	1000	9,260.00	
42	272¼	2000	19,110.00	
43	274	500	4,630.00	
44	274½	400	3,704.00	
45	275	1200	11,112.00	
46	277½	1000	9,555.00	
47	281¼	500	4,630.00	
48	282¼	1200	11,407.00	
49	283½	2000	18,815.00	
50	285	1500	14,480.00	
51	286	900	8,629.00	
52	287¼	1500	14,480.00	
53	288¼	2400	23,109.00	
54	291	200	1,852.00	
55	291¼	200	1,852.00	
56	291¾	1200	11,407.00	
57	292¼	1200	11,407.00	
58	302½	600	5,556.00	
59	304	1100	10,481.00	
		78600'	$749,651.00	

NO.	MILES FROM EDMONTON	LENGTH OF WORKS	ESTIMATED COST	REMARKS
		78600'	$749,651.00	
60	307¼	2600	24,371.00	
61	308¼	1400	13,259.00	
62	311	1600	15,406.00	
63	313¼	1600	15,111.00	
64	319	1800	17,258.00	
65	321	2100	20,034.00	
66	322¼	1500	13,890.00	
67	322¾	300	2,778.00	
68	326	1100	10,481.00	
69	327	400	3,704.00	
70	327¾	1500	14,185.00	
71	331	400	3,704.00	
72	332	1200	11,112.00	
73	336¾	500	4,630.00	
74	339½	2000	19,110.00	
75	357¼	2000	19,110.00	
76	359½	1700	16,332.00	
77	361¾	1100	10,776.00	
78	365	1600	15,406.00	
79	369	1500	14,480.00	
80	371½	2000	19,405.00	
81	377¾	2100	20,034.00	
82	381	1200	11,407.00	
83	386	1600	16,668.00	
84	388¾	1500	14,185.00	
85	390	2300	21,888.00	
86	393¼	1000	9,260.00	
87	397	900	8,629.00	
88	400¾	800	8,003.00	
89	401¼	1400	13,259.00	
90	405¼	1500	14,185.00	
		123000'	$1,171,711.00	

NO.	MILES FROM EDMONTON	LENGTH OF WORKS	ESTIMATED COST	REMARKS
		123000'	$1,171,711.00	
91	409	1800	16,963.00	
92	411	1000	9,555.00	
93	412¾	1000	9,555.00	
94	414¾	900	8,629.00	
95	417	800	7,408.00	
96	421	800	8,003.00	
97	439¾	1000	9,260.00	
98	443½	800	8,003.00	
99	446	600	5,556.00	
100	456¼	400	3,704.00	
101	456¾	1000	9,555.00	
102	457½	400	3,704.00	
103	458½	1000	9,555.00	
104	468¾	900	8,629.00	
105	478¾	600	5,556.00	
106	496½	1600	15,406.00	
107	502¾	1400	13,259.00	
108	670¾	3800	36,663.00	
	TOTAL	142800'	$1,360,674.00	

PLATE C-I


Public Works, Canada
SKETCH PLAN
Showing
Proposed Improvements
AT
LA COLLE FALLS,
ON THE
NORTH SASKATCHEWAN RIVER
SCALE 400 FEET TO AN INCH
CROSS SECTION OF DAM
SCALES Horiz 400' = 1" Vert 40' = 1"
TYPICAL SECTION OF DAM
LOCK
SCALES Hor 400' = 1" Ver 40' = 1"
PLAN
NORTH SASKATCHEWAN RIVER
CANAL
Embankment
Intake
Spillways
DAM
LOCK
POWER STATION
TAIL RACE
Tp. 49, R 22, W. 2nd Mer.
Quarter Section Line, Sec 31
Quarter Section Line, Sec 30
Section 30
Section 29
Centre Line of Present Channel
flow
PROFILE ON CENTRE LINE OF CHANNEL
25 M From PRINCE ALBERT
26 M
27 M
28 M
29 M
30 M
Head Peace Rap (No 1)
Head Big Stone Rap (No 2)
Head Squaw Rap (No 3)
Head Demie Charge Rap (No 4)
Head Rap (No 5)
Head Rap (No 6)
Head Steep Creek Rap (No 7)
Head Rap (No 8)
Foot
1330.8 Normal Working Level of Water (held by flashboards)
1328.8 Raised Water Crest of Dam
Low Water
Coping Lock 1340.8
1324.8 Upper Sill Lock
1307.8 L.W. (Mitchell)
Lower Sill Lock
1310 Foot Tail-Race
Bottom Tail-Race 1289.8
Top of Wall El 1340.8
Raised Water El 1330.8 (held by flashboards)
Permanent Crest of Dam El 1328.8
Low Water El 1307.8 (Mitchell)
El 1300.8
Elev 1340.8
Raised Water El 1330.8
El 1324.8
El 1320.8
Low Water 1307.8

Rapids above La Colle Falls Dam.

Upon the completion of the Works undertaken by the City of Prince Albert in connection with the development of Hydro-Electric Power at "La Colle Falls", five of the first Rapids of the series, viz: the Peace, Big Stone, Squaw, Demie Charge, and Rapid No. 5, will be flooded out, and the new level established will afford ample depth for navigation for a distance of 6 miles above the Dam.

Cost of Completing Lock and Dam. The estimated cost of completing the unfinished portions of the City's Lock, Dam, and Spillway for the requirements of navigation alone, i.e., without regard to any ultimate Power Development, amounts to $325,000.00 approximately. This sum is made up as follows:-

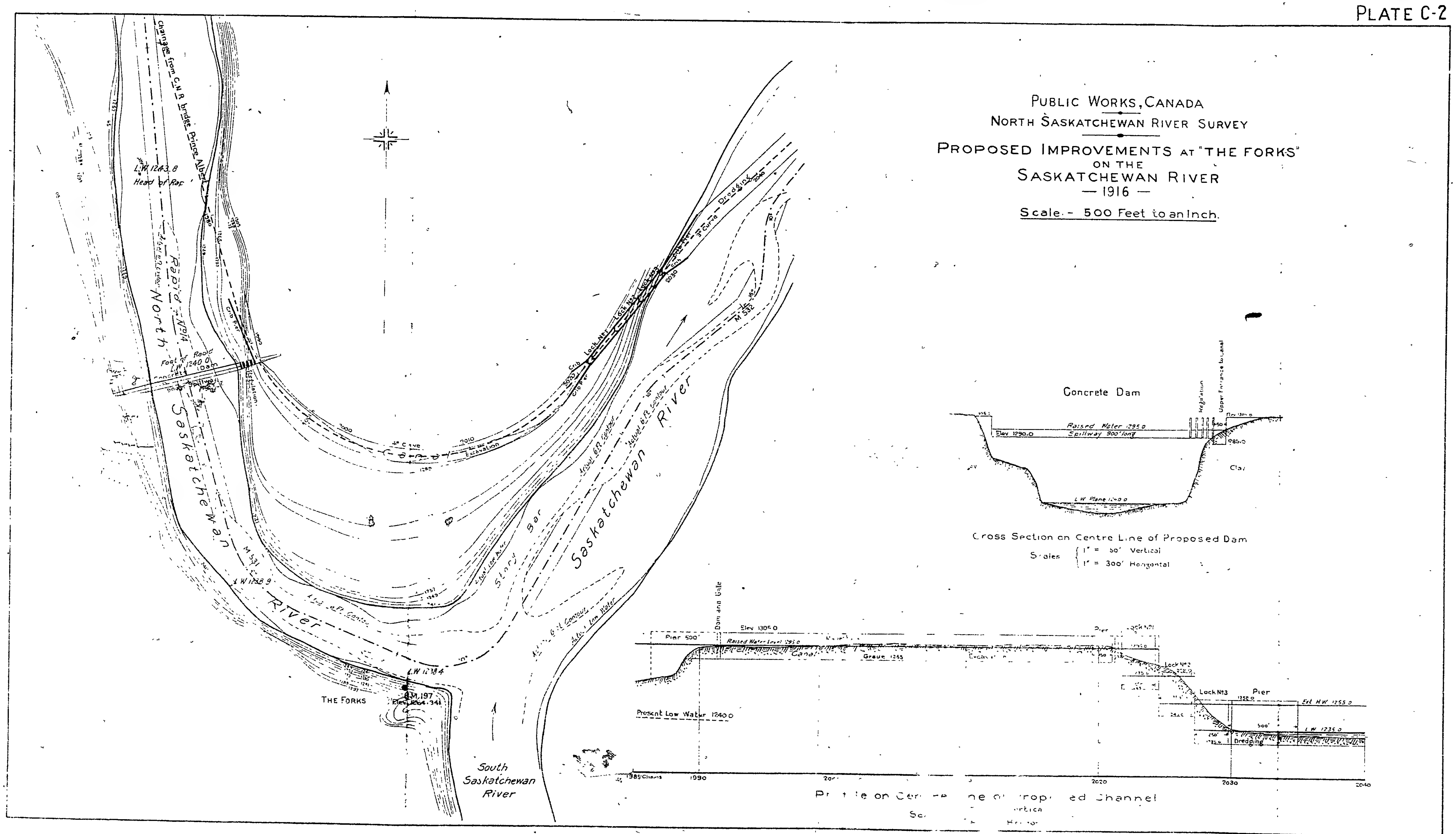
	Cost to Complete
Dam and Spillway	$287,139.00
Lock	21,355.00
Gathering plant repairing South Lock wall, &c. say	16,506.00
TOTAL	$325,000.00

The general Estimate on page 83, provides for this expenditure, as in the event of the City of Prince Albert being unable to carry out their Power Development, the Government may be called upon to complete the Lock and Dam.

To enlarge the present Lock to standard size (250'x50') an additional expenditure of approximately $125,000.00 will be involved. This amount does not appear in the Estimate, as a larger Lock will probably not be required here for a number of years after the upper part of the river has been made navigable.

The general layout of improvement works at La Colle Falls, with Profile of River, typical section of Dam, etc., is shown on Plate C-1. A description of same will be found in the Chapter dealing with "POWER AND STORAGE", page 86 and following.

PLATE C-2


PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
PROPOSED IMPROVEMENTS AT "THE FORKS" ON THE SASKATCHEWAN RIVER
— 1916 —
Scale.- 500 Feet to an Inch.
Chainage from C.N.R. bridge Prince Albert
L.W. 1243.8
Head of Rap.
Rapid
North Saskatchewan River
Foot of Rapid
L.W. 1240.0
Dam
Spillway
Crib Lock No.1
Lock No.2
Lock No.3
Dredging
Excavation
Stony Bar
Saskatchewan River
Actual 6 Ft. Contour
Actual Low Water
M. 531
M. 532
L.W. 1238.9
L.W. 1218.4
B.M. 197
THE FORKS
South Saskatchewan River
Concrete Dam
Raised Water 1295.0
Elev. 1290.0
Spillway 900' long
Regulation
Upper Entrance to canal
L.W. Plane 1240.0
Clay
Cross Section on Centre Line of Proposed Dam
Scales 1" = 50' Vertical
1" = 300' Horizontal
Dam and Gate
Pier 500'
Elev. 1305.0
Raised Water Level 1295.0
Canal
Grade 1265
Lock No.1
Lock No.2
Lock No.3
Pier
Ext. H.W. 1255.0
L.W. 1235.0
Dredging
Present Low Water 1240.0
1985 Chains
1990
2020
2030
2040

Rapids above "The Forks".

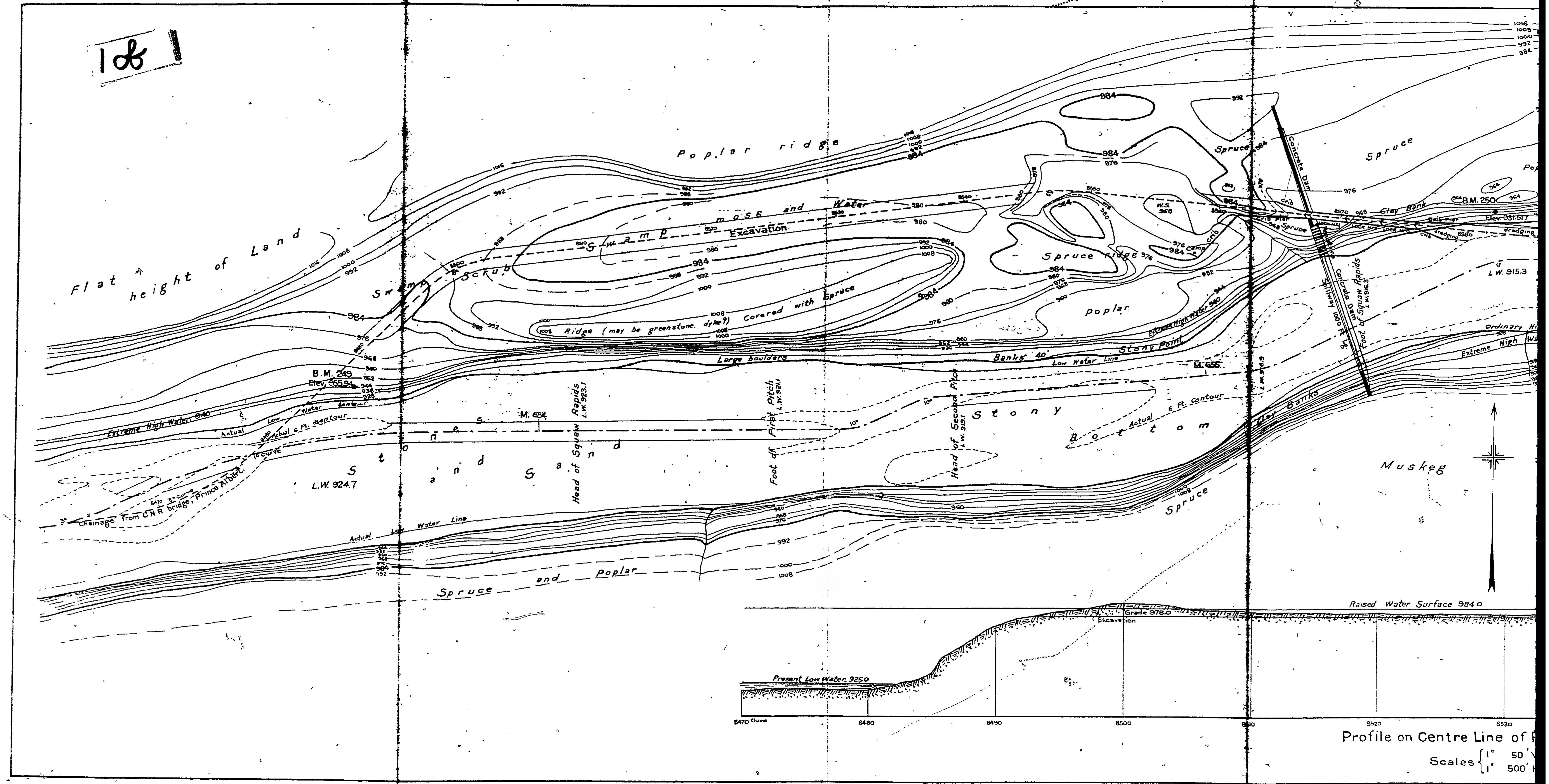
It is proposed to over come the remaining Rapids of the La Colle Falls series below the Tail Race of the Prince Albert Power Works, by the construction of a Dam, with Locks and Canal, as shown on Plate C-2.

Dam. A concrete dam built at the foot of the last Rapids at "The Forks", having a 900 foot spillway at Elevation 1290.0 (N.S.R.S. Datum) and raising the water 60 feet to Elevation 1295.0 under normal conditions, will flood all rapids above for a distance of 8 miles. The crest of Dam at Elevation 1305.0 will allow of a 15 foot flood discharging over the spillway. To pass abnormal floods with additional safety, four sluiceways are provided for at the east end of the spillway.

Locks and Canal. It is proposed to locate a flight of three Locks, each of 22 feet lift, on the West Bank of the Saskatchewan about ½ mile below The Forks. The arrangement shown provides for Locks of the standard size (250'x50') with 10 feet of water on sills, and crib piers at the lower and upper entrances carried to the Elevation of the Lock copings. A double set of gates will be placed at the entrance to the Upper Lock.

The Canal connecting the Locks with the reach above the Dam follows closely the curved contour 1297. Excavation to grade 1285.0 will give a depth of 6 feet of water in the canal during the winter months when the spillway is discharging a minimum of 1,000 c.f.s. During the season of navigation (May to November) when the minimum discharge varies between 5,000 and 7,000 c.f.s. the depth of water in the Canal will be from 8 to 10 feet.

The entrance at the upper end of the Canal is placed in the Dam. A crib pier 500 feet long will serve as a protection to vessels when entering or leaving the Canal. Gates are



Flat height of Land
Poplar ridge
Swamp moss and Water
Swamp Scrub
Excavation.
Ridge (may be greenstone dyke?) Covered with Spruce
Spruce ridge
Spruce
Poplar
Concrete Dam
Crib
Camp
Clay Bank
B.M. 250
Lock No. 1
dredging
L.W. 915.3
Extreme High Water 940
Stony Point
Banks 40'
Low Water Line
Large boulders
B.M. 249
Elev. 955.94
Extreme High Water 940
Actual Low Water Contour
Actual 6 Ft. Contour
Chainage from C.N.R. bridge, Prince Albert.
Stones and Sand
L.W. 924.7
M. 654
M. 655
Head of Squaw Rapids L.W. 923.1
Foot of First Pitch L.W. 921.1
Head of Second Pitch L.W. 918.1
Stony Bottom
Spillway 1000 ft.
Foot of Squaw Rapids L.W. 916.3
Ordinary High Water
Extreme High Water
Clay Banks
Muskeg
Actual Low Water Line
Spruce and Poplar
Raised Water Surface 984.0
Grade 978.0
Excavation
Present Low Water 925.0
8470 Chains
8480
8490
8500
8510
8520
8530
Profile on Centre Line of
Scales 1" 50' V, 1" 500' H

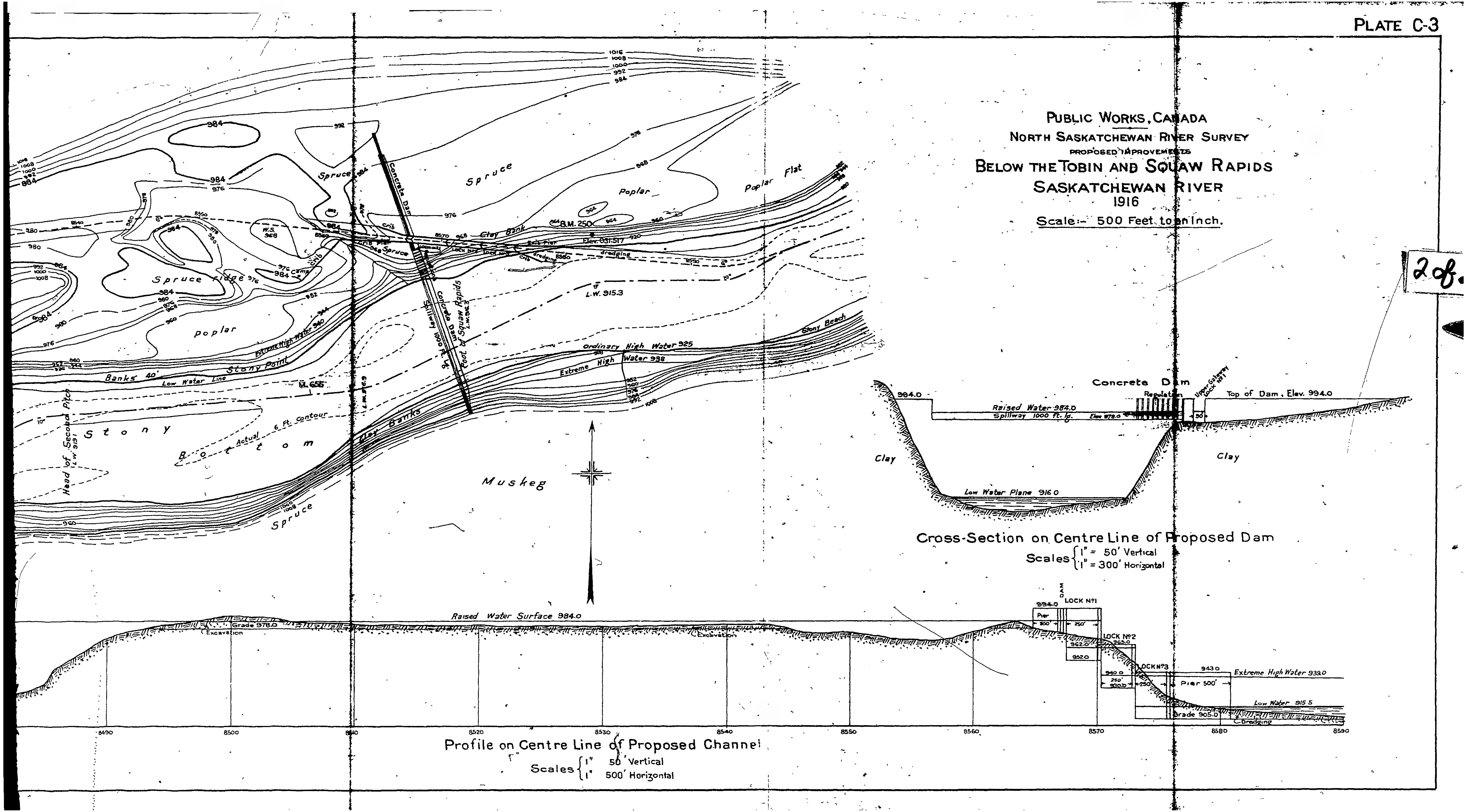


PLATE C-3
PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
PROPOSED IMPROVEMENTS
BELOW THE TOBIN AND SQUAW RAPIDS
SASKATCHEWAN RIVER
1916
Scale:- 500 Feet to an Inch.
2 of
Spruce
Poplar
Poplar Flat
Clay Bank
B.M. 250
Elev. 931.517
Spruce Ridge
Camp
Crib
Concrete Dam
Spillway 1000 ft. lg.
Foot of Squaw Rapids
L.W. 915.3
Extreme High Water 940
Ordinary High Water 925
Extreme High Water 938
Stony Beach
Stony Point
Banks 40'
Low Water Line
Clay Banks
Actual 6 Ft. Contour
Head of Second Pitch
Stony Bottom
Muskeg
dredging
Concrete Dam
Regulating
Top of Dam, Elev. 994.0
984.0
Raised Water 984.0
Spillway 1000 ft. lg.
Clay
Clay
Low Water Plane 916.0
Cross-Section on Centre Line of Proposed Dam
Scales {1" = 50' Vertical
1" = 300' Horizontal
Raised Water Surface 984.0
Grade 978.0
Excavation
Excavation
DAM
LOCK No 1
994.0
Pier
LOCK No 2
965.0
962.0
952.0
LOCK No 3
940.0
943.0
Pier 500'
Extreme High Water 939.0
Low Water 915.5
Grade 905.0
Dredging
8490
8500
8510
8520
8530
8540
8550
8560
8570
8580
8590
Profile on Centre Line of Proposed Channel
Scales {1" 50' Vertical
1" 500' Horizontal

provided here for the unwatering of the Canal.

Made banks are to be raised to the level of the Lock copings; and the spoil material from canal prism will be utilized for embankments. Excavation is chiefly clay with some surface loam; and properly packed this will afford excellent material for embankments.

Estimate for Improvements. The estimated cost of proposed improvements amounts to approximately $2,779,470.00. Items forming this amount are given in the Preliminary Estimate on the following page.

Improvement of Tobin and Squaw Rapids.

A concrete dam, about 2400 feet in length, with a flight of three locks of even lift, at the location shown on Plate C-3, is proposed to overcome the Tobin and Squaw Rapids, and for the improvements of a reach of 47 miles above these rapids.

With a 1000 foot spillway at crest elevation 968 (N.S.R.S. Datum) such a dam will permit of the raising of the water from Elevation 916.5 to Elevation 984.0, or 68.5 feet, whilst providing a discharge of 213,000 cubic feet per second with 16 feet of water passing over the spillway. This discharge is the greatest known during flood periods on either branch of the Saskatchewan River.

To insure safety against the combined maximum floods of these Rivers, an elevation of 994 for crest of Dam has been adopted and is considered ample for any emergency.

Locks are to be of concrete, of the standard size (250'x50') with 10 feet of water on sills. Guard gates and crib piers are provided at both entrances, as shown.

A small amount of dredging will be required at the lower entrance, and some 115,000 cubic yards of dry excavation in the upper reach, to secure a minimum depth of 6 feet in the channel, as will be seen on examination of the profile.

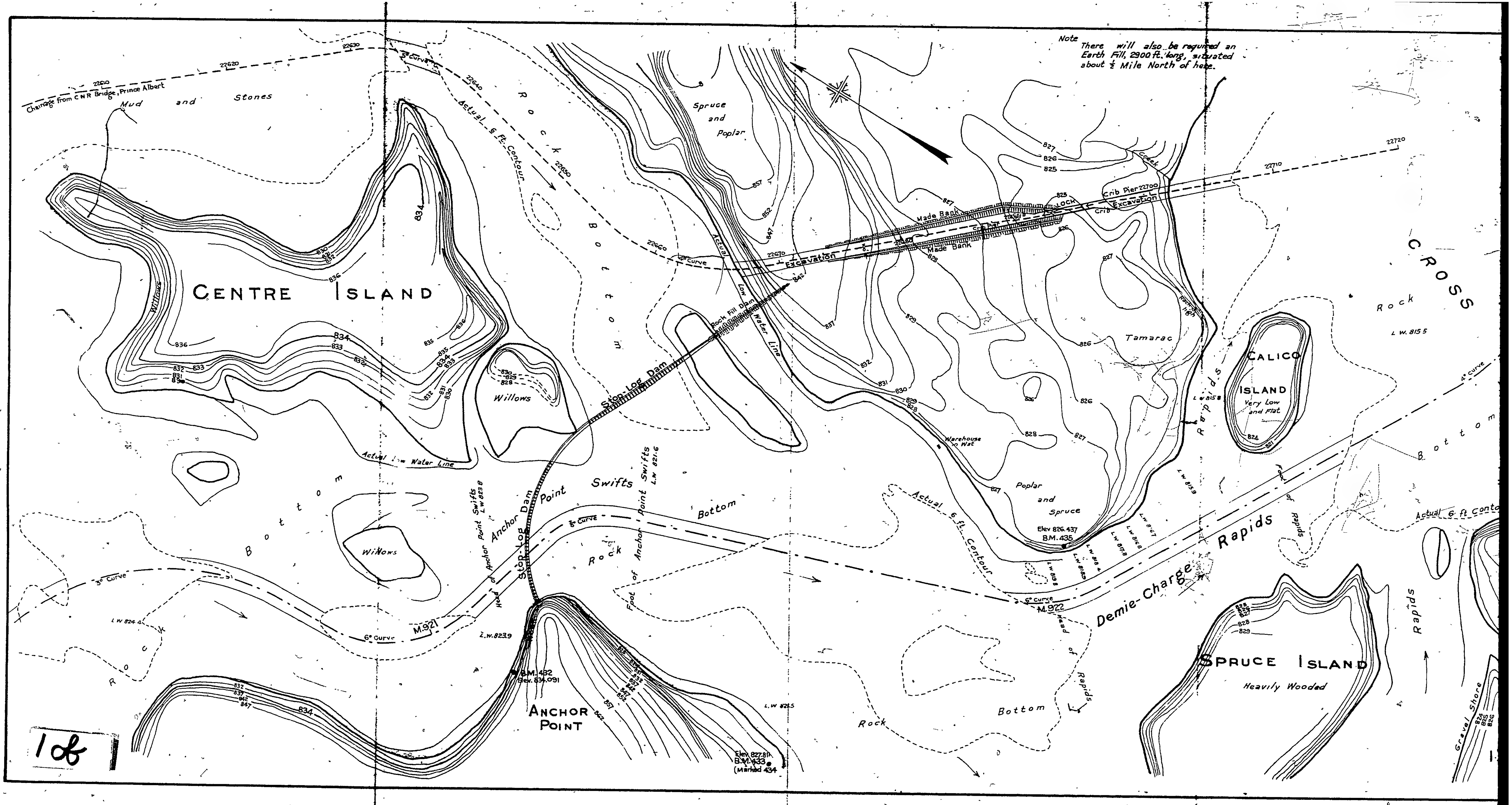
NORTH SASKATCHEWAN RIVER SURVEY

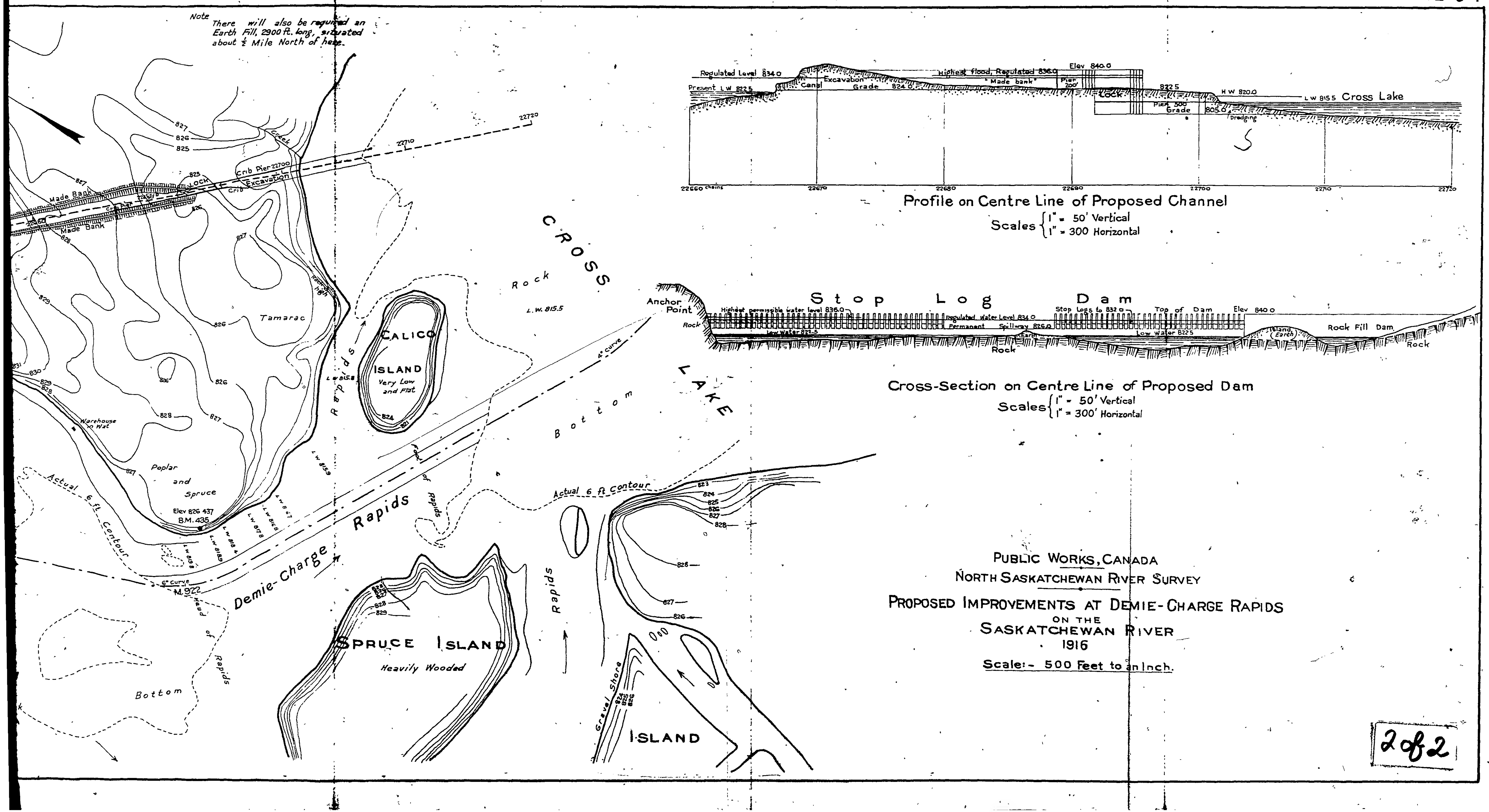
PRELIMINARY ESTIMATE

FOR IMPROVEMENTS AT "THE FORKS" (MILE 531)

Raised Water, El. 1295.0--Dam and Three Locks. Lift 60 Ft

DESCRIPTION	QUANTITIES Cu. Yds.	PRICE	COST	TOTAL
Concrete Dam				
Length 1300' Spillway 900'				
Concrete	119,600	10.00	1196,000	
Excavation Dry	99,200	.50	49,600	
Unwatering Bulk Sum			150,000	$1395,600
Flight of Three Locks & Approaches				
Channel above Locks				
Crib Entrance Pier (500 L.Ft)	8,740	3.00	26,220	
Earth Excavation	82,000	.35	28,700	
Loose Rock "	82,000	.75	61,500	
Lockgates (1 Pair)		11,000	11,000	
Upper Entrance				
Crib Entrance Piers (400L.Ft)	4,440	3.00	13,320	
Locks (50x250)				
Excavation dry in Lockpit #1	21,000	.60	12,600	
" " " " #2	25,000	.60	15,000	
" " " " #3	22,000	.60	13,200	
Concrete in Lock #1	27,000	10.00	270,000	
" " " #2	22,000	10.00	220,000	
" " " #3	24,000	10.00	240,000	
Unwatering Lock #3 Bulk Sum			10,000	
Backfilling around locks &	30,000	.35	10,500	
Lockgates (5 Pairs)--works		11,000	55,000	
Valves and machinery			32,000	
Operating machinery for locks			22,000	
Lock houses, surfacing, bollards, lights etc.			22,000	
Lower Entrance				
Crib Entrance Piers (200-500= 700 lin ft.)	18,400	3.00	55,200	
Excavation	37,000	.35	12,950	$1131,190
				$2,526,790
Engineering & Contingencies, 10%				252,680
Total				$2,779,4[illegible]


Note
There will also be required an Earth Fill, 2900 ft. long, situated about ½ Mile North of here.
Chainage from C N R Bridge, Prince Albert
22610
22620
22630
22640
22650
22660
22670
22700
22710
22720
Mud and Stones
Actual 6 ft. Contour
Rock Bottom
Spruce and Poplar
Creek
Made Bank
LOCK
Crib Pier
Crib
Excavation
Rock Fill Dam
Low Water Line
Stop-Log Dam
CENTRE ISLAND
Willows
Actual Low Water Line
Tamarac
Rapids
CROSS
Rock
L.W. 815.5
CALICO ISLAND
Very Low and Flat
Warehouse
Poplar and Spruce
Elev 826.437
B.M. 435
Point Swifts
Head of Anchor Point Swifts
L.W. 823.8
Stop-Log Anchor Dam
Foot of Anchor Point Swifts
L.W. 821.6
Bottom
Rock
3° Curve
6° Curve
8° Curve
4° Curve
M.921
M.922
Demie-Charge Rapids
Head of Rapids
Foot of Rapids
L.W. 824.4
L.W. 823.9
B.M. 432
Elev. 834.091
ANCHOR POINT
L.W. 821.5
Elev. 827.81
B.M. 433
(Marked 434)
SPRUCE ISLAND
Heavily Wooded
Gravel Shore
10b


Note There will also be required an Earth Fill, 2900 ft. long, situated about ½ Mile North of here.
Profile on Centre Line of Proposed Channel
Scales { 1" = 50' Vertical
1" = 300 Horizontal
Regulated Level 834.0
Highest flood, Regulated 836.0
Elev 840.0
Present L.W. 822.5
Canal
Excavation
Grade 824.0
"Made bank"
Lock
H W 820.0
L W 815.5 Cross Lake
Grade 805.0
Dredging
Stop Log Dam
Anchor Point
Highest permissible water level 836.0
Regulated Water Level 834.0
Stop Logs to 832.0
Top of Dam
Elev 840.0
Permanent Spillway 826.0
Low Water 822.5
Rock
Rock Fill Dam
Cross-Section on Centre Line of Proposed Dam
Scales { 1" = 50' Vertical
1" = 300' Horizontal
CROSS LAKE
Rock
L.W. 815.5
Bottom
CALICO ISLAND
Very Low and Flat
Rapids
Tamarac
Made Bank
Crib Pier 22700
Excavation
Lock
Creek
Warehouse in Wat
Poplar and Spruce
Elev 826.437
B.M. 435
Actual 6 ft Contour
Demie-Charge Rapids
Foot of Rapids
Head of Rapids
Bottom
SPRUCE ISLAND
Heavily Wooded
Gravel Shore
ISLAND
PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
PROPOSED IMPROVEMENTS AT DEMIE-CHARGE RAPIDS
ON THE
SASKATCHEWAN RIVER
1916
Scale:- 500 Feet to an Inch.
2 of 2

Estimate. The estimated cost of works outlined above amounts to $4,349,380.00. A detail of this estimate is given on the following page.

Demie Charge Rapids (Lower Saskatchewan).

Dam. By reference to Plates 58 and C-4, it will be readily seen that for 6 foot navigation, the Demie Charge Rapids can best be overcome by simple lockage with Canal. In connection, however, with the creation of a 10 foot navigation between Le Pas and Lake Winnipeg, which is here considered, a scheme involving the regulation of Cedar Lake by means of a stop-log type of Dam, as shown on Plate C-4, is proposed.

With a head of 8 feet on a spillway 1800 feet long at Elevation 828 (our Datum), a solid Dam at the location shown discharging freely - which is impracticable in this instance - would take care of about 150,000 cubic feet per second, which is regarded as the maximum flow of the river here. As a submerged weir, the design adopted, i.e., stop-log Dam 2600 feet long, with crest Elevation 828, and 80 piers, 5 feet thick, would discharge this maximum flow after allowing 4% for end contractions.

Regulation of Cedar Lake Level. By means of such a structure, the level of Cedar Lake could be maintained between Elevations 834 and 836 without incurring damage by flood conditions, high water at the East end of the Lake being estimated at 838 or 2 feet higher. The raised level would establish a 10 foot navigation system for Lake Vessels as far as Le Pas, without increasing the cost of dredging necessary for a 6 foot navigation, the difference in cost between the two systems being in the initial Cost and Maintenance of the Dam, only. The new level, moreover, would allow of continuous navigation across the Lake - which, at present, is not possible even for flat bottom boats, on account

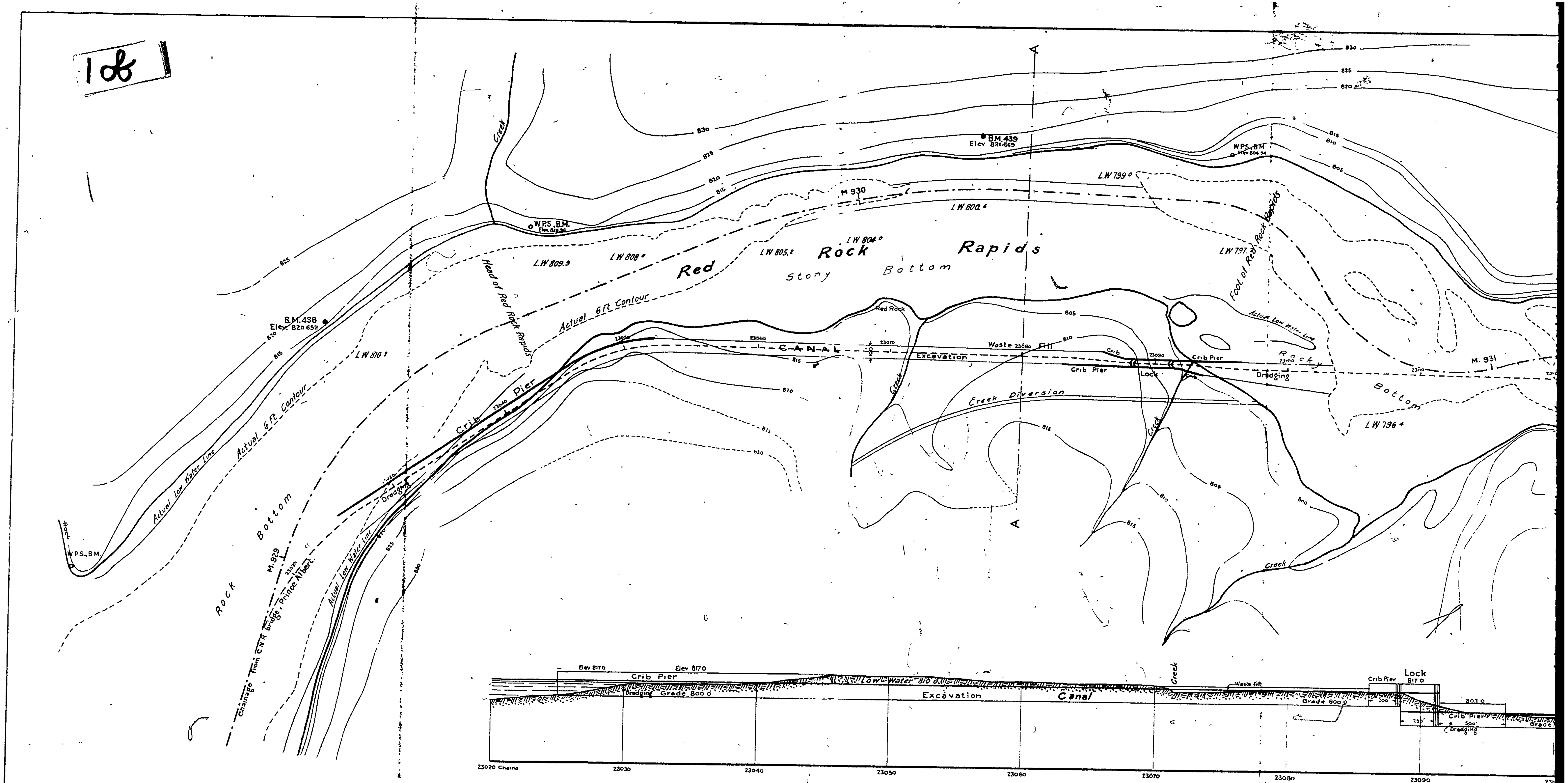
NORTH SASKATCHEWAN RIVER SURVEY

PRELIMINARY ESTIMATE

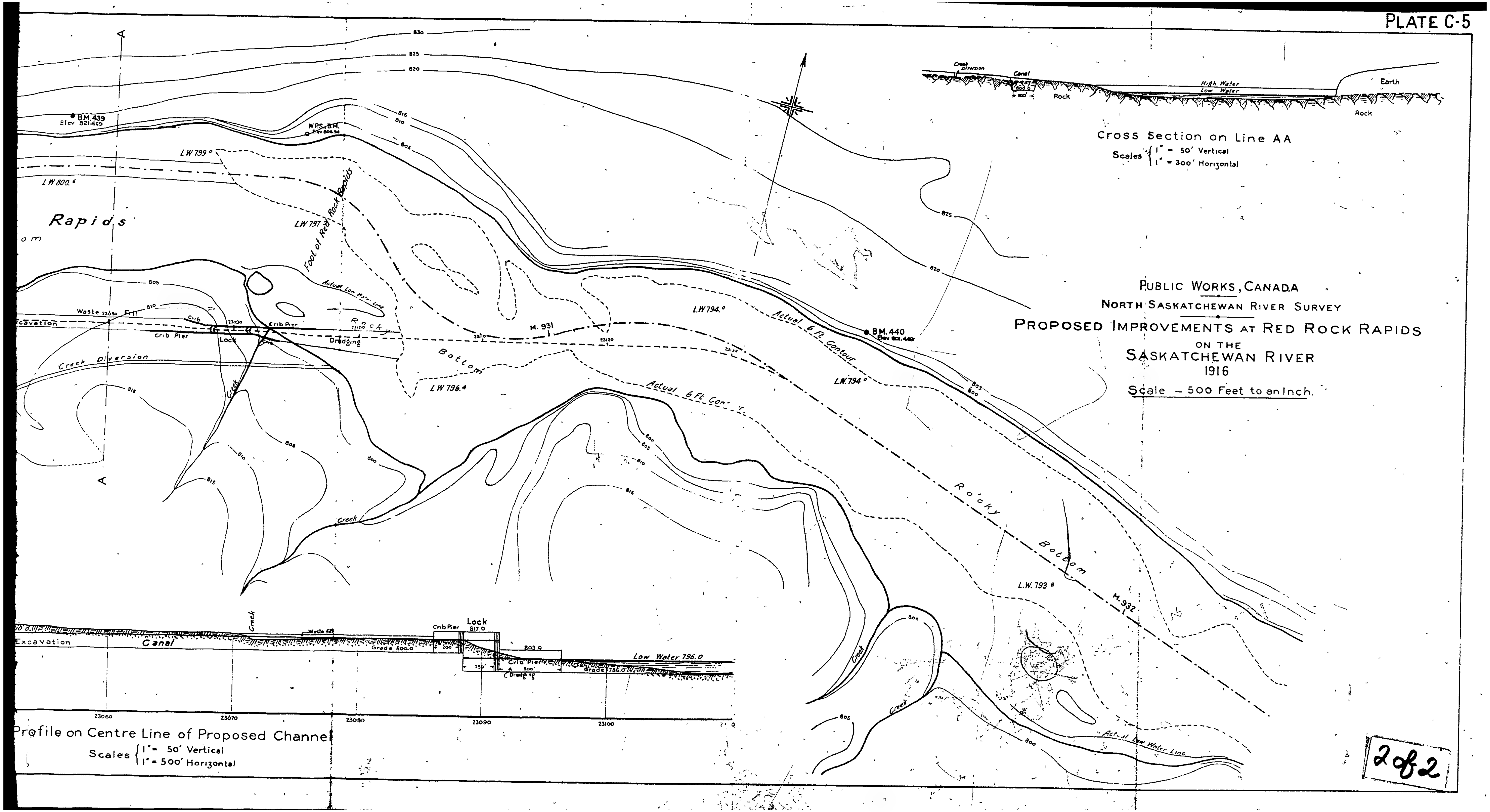
FOR IMPROVEMENTS AT TOBIN & SQUAW RAPIDS (MILE 655)

Raised Water, El. 984----Dam and Three Locks. Lift 68.6 Ft.

DESCRIPTION	QUANTITIES Cu. Yds.	PRICE	COST	TOTAL
Concrete Dam				
Length 2400' Spillway 1000'				
Concrete	227,634	10.00	2276,340	
Excavation dry	168,700	.50	84,350	
Unwatering Bulk Sum			100,000	$2460,69
Flight of Three Locks & Approaches				
Channel above Locks				
Earth Excavation	80,000	.35	28,000	
Loose Rock "	35,000	.75	26,250	
Upper Entrance				
Crib Entrance Piers (200-1000= 1200 lin.Ft.)	12,000	3.00	36,000	
Locks. (50x250)				
Excavation dry in Lockpit #1	20,000	.60	12,000	
" " " " #2	27,000	.60	16,200	
" " " " #3	31,000	.60	18,600	
Concrete in Lock #1	43,300	10.00	433,000	
" " " #2	31,000	10.00	310,000	
" " " #3	37,900	10.00	379,000	
Unwatering Lock #3 Bulk Sum			5,000	
Backfilling around locks &	30,000	.35	10,500	
Lockgates (5 Pairs)-works.		11,000	55,000	
Valves and machinery			32,000	
Operating machinery for locks			22,000	
Lock houses, surfacing, bollards, lights etc.			22,000	
Lower Entrance				
Crib Entrance Piers (200-500= 700 lin.ft.)	23,650	3.00	70,950	
Excavation	48,000	.35	16,800	$1493,30
				$3,953,99
Engineering & Contingencies, 10%				395,39
Total				$4,349,38



Profile on Centre Line of Proposed Channel
Scales { 1" = 50' Vertical / 1" = 500' Horizontal }


PUBLIC WORKS, CANADA
NORTH SASKATCHEWAN RIVER SURVEY
PROPOSED IMPROVEMENTS AT RED ROCK RAPIDS
ON THE
SASKATCHEWAN RIVER
1916
Scale – 500 Feet to an Inch.
Cross Section on Line AA
Scales { 1" = 50' Vertical
1" = 300' Horizontal
Creek Diversion
Canal
High Water
Low Water
Earth
Rock
Profile on Centre Line of Proposed Channel
Scales { 1" = 50' Vertical
1" = 500' Horizontal
Excavation
Canal
Creek
Waste Fill
Crib Pier
Lock
817.0
803.0
Grade 800.0
Low Water 796.0
Dredging
23060
23070
23080
23090
23100
B.M. 439
Elev 821.669
W.P.S. B.M.
LW 799.0
LW 800.6
Rapids
Foot of Red Rock Rapids
LW 797
Actual Low Water Line
Rocky Bottom
LW 796.4
M. 931
LW 794.0
Actual 6 Ft. Contour
B.M. 440
Creek Diversion
Waste Fill
Excavation
Crib Pier
Lock
Dredging
L.W. 793.8
M. 932
Creek
Actual Low Water Line
830
825
820
815
810
805
800

2 of 2

of the heavy seas running for days after a storm has subsided.

Canal and Lock. The Channel, for the lockage system proposed, will be transferred to the East side of Centre Island, entering the bank near the head of a small, low island (Plate C-4). Here a limestone ledge is found, and it is probable that rock exists also throughout the bulk of the cut above the Lock, at Elevation 820. At the present time, however, this is overlaid by a large quantity of muck, so that drainage would have to be resorted to during construction.

The Lock has been placed at the lower end of the Canal, near Cross Lake, which was found to be the most advantageous position. It will be of the standard size (250'x50'), with 10 feet of water on sills, and have a lift of 20.5 feet. Crib approaches are provided, as shown, and are carried level with the copings of Lock (Elevation 840) in the upper reach. Made banks extend on both sides of the Canal from the upper end of lock, north for 1,500 feet, to high ground. The Canal is to be 100 feet wide at the bottom and 10 feet deep at low water. The excavation for this canal is expected to be mostly in rock.

Some dredging will be required at both ends of the Canal as shown. The rock fill at end of stop-log section of Dam will be made from material dredged, the canal banks being built from material taken from canal prism.

Estimated Improvements at Demie Charge Rapids. The estimated cost of improvements at the Demie Charge Rapids is given as $1,837,400.00. A detailed statement of items forming this amount appears on the following page.

Red Rock Rapids.

It is proposed to overcome these Rapids by a single Lock with Canal, the general arrangement of which is shown on Plate C-5.

A Dam at the head of the Rapids - which is the only site available - is considered unnecessary from the point of

NORTH SASKATCHEWAN RIVER SURVEY.

PRELIMINARY ESTIMATE

FOR IMPROVEMENTS AT DEMICHARGE RAPIDS

Cedar Lake, Raised water 834 --- Dam, Lock and Canal - Lift 18.5 Ft.

DESCRIPTION		QUANTITIES	PRICE	COST	TOTAL
Stop-Log Dam (Length 2800')					
Excavation Earth	C.Yds	2,500	.50	1,250	
" Rock	"	15,000	2.00	30,000	
Concrete	"	50,000	10.00	500,000	
Cement finish on bridge	S.Yds	5,500	.75	4,125	
Drilling rock bolt holes	L.Ft.	10,000	.50	5,000	
Foundation & Anchor Bolts	Lbs.	180,000	.06	10,800	
Structural Steel with SW.	"	2000,000	.05	100,000	
Reinforcing rods	"	1200,000	.05½	66,000	
Steel Nosings	"	200,000	.05	10,000	
Cofferdams & Unwatering-Bulk Sum				50,000	
Floor, track, stop logs & machinery				80,000	857,175
Rock Fill Dam					
Length 800' At East end of Stop Log Dam.					
Rock fill	C.Yds	22,600	2.00	45,200	45,200
Earth Fill Dam-North of Lock.					
Earth Fill	C.Yds	20,000	.60	12,000	12,000
					914,375
Canal & Lock					
Canal above Lock					
Excavation Earth to be used in embankment. Price includes overhaul		48,000	.50	24,000	
Excavation Solid Rock		48,000	2.00	96,000	
Embankment 52,000 C.Y. made from above.					
Upper Entrance		C.Yds			
Crib Entrance Piers 700 L.Ft.		5,400	3.00	16,200	
Lock (50x250)					
Excavation Earth dry in lockpit		7,000	.60	4,200	
" Solid Rock " "		14,000	2.00	28,000	
Concrete in Lock		35,900	10.00	359,000	
Backfilling around lock & works		10,000	.35	3,500	
Lockgates (4 Pairs)			11,000	44,000	
Valves and Machinery				12,000	
Operating machinery for lock				8,000	
Lock, surfacing, bollards, lights, etc.				8,000	
Lower Entrance					
Crib Entrance Piers 700 L.Ft.		6,500	3.00	19,500	
Excavation Solid Rock dry		41,000	2.00	82,000	
Dredging " "		17,200	3.00	51,600	756,000

$1,670,375

Engineering & Contingencies, 10% - 167,025

Total $1,837,400

view of navigation. Such a dam could serve no other purpose than to drown out the Cross Lake Rapids and to add to the storage of Cross Lake.

A comparison of the cost of a Canal with Dam drowning the Cross Lake Rapids, with the cost of dredging these rapids, necessary in connection with the Canal and lockage system proposed, shows a difference in total Capital Cost in favour of the latter system. Moreover, as the Works designed to overcome the Grand Rapids, a few miles below, are intended for the safeguarding of a large amount of Power - probably more than can be utilized for a number of years - the development of additional Power at the Red Rock Rapids does not appear advisable.

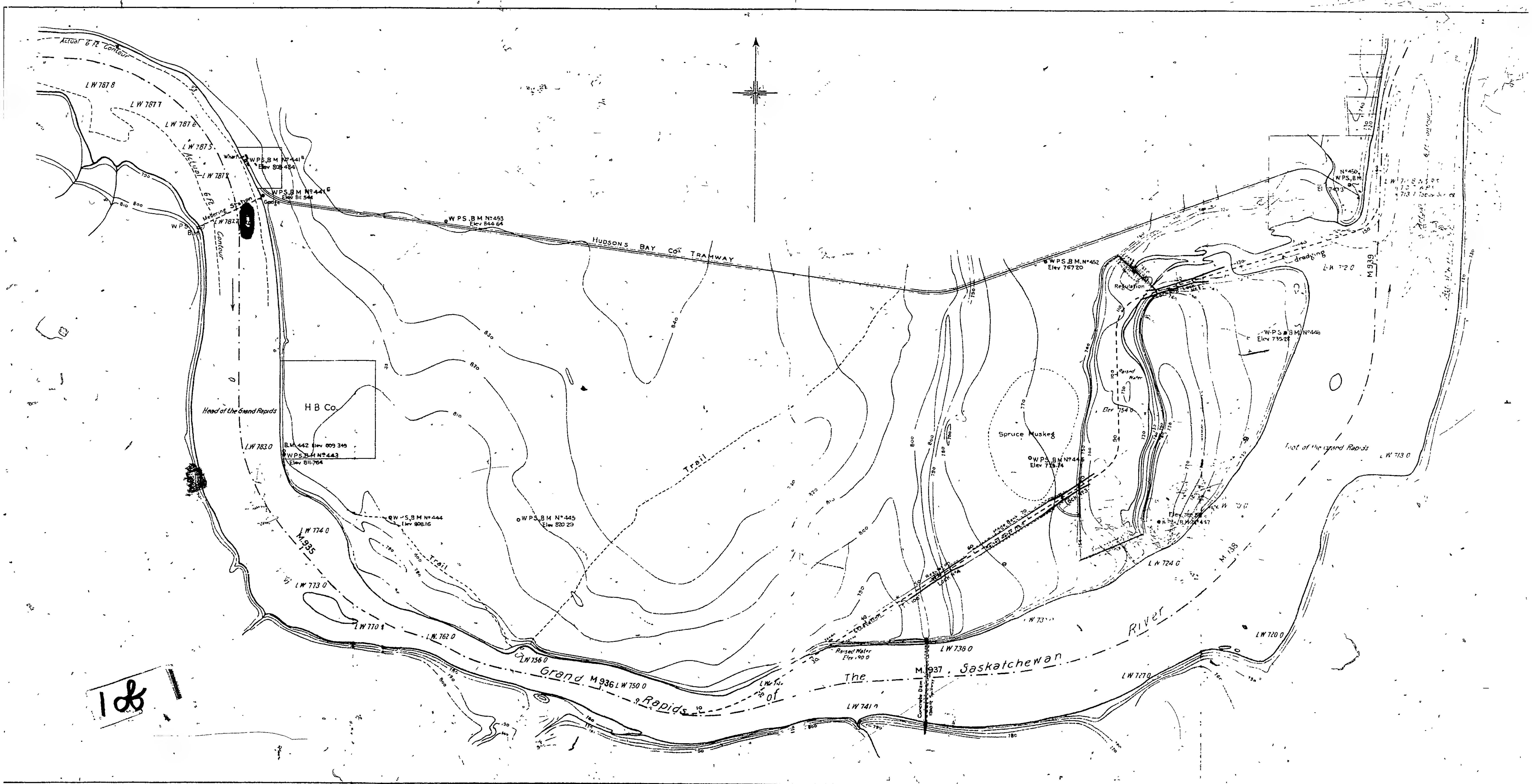
Lock and Canal. The lower entrance to the Lock is placed behind the gravel islands at the foot of the rapids proper; for safety, the upper crib entrance to the Canal is carried out in the River about ½ mile above the head of the rapids, to near Mile 929, as appears on plan.

The Lock is to be of concrete, of the standard size (250'x50') and designed for a lift of 14 feet, with 10 feet of water on the sills. Guard gates and crib entrance piers are provided for, as shown. Copings of Lock, upper pier, and top of made embankment, are to be carried to Elevation 817 (our datum) to insure safety against excessive floods.

The Canal is to be 100 feet wide at the bottom, with earth slopes of 1½ to 1, and sides cut vertical where rock is encountered. At grade elevation 800, a 10 foot channel will be available at low stages.

A creek diversion will be necessary and is provided for, as shown.

Embankments etc. Excavation in canal East of Creek will furnish the material for a long protection fill, largely of rock, in extension of the gravel bar North of the lower



Actual 6 ft Contour
LW 787.8
LW 787.7
LW 787.6
LW 787.5
Wharf
W.P.S. B.M. No. 441B
Elev 808.434
W.P.S. B.M. No. 441C
Elev 811.544
Metering Station
W.P.S. B.M. No. 453
Elev 844.64
HUDSONS BAY CO. TRAMWAY
W.P.S. B.M. No. 452
Elev 767.20
Regulation
dredging
M.939
W.P.S. B.M. No. 446
Elev 735.28
Head of the Grand Rapids
H B Co.
LW 783.0
B.M. 442 Elev 809.349
W.P.S. B.M. No. 443
Elev 811.764
Trail
Spruce Muskeg
Raised Water
Foot of the Grand Rapids
LW 713.0
W.P.S. B.M. No. 444
Elev 808.16
W.P.S. B.M. No. 445
Elev 820.29
LW 774.0
M.935
LW 773.0
LW 770
LW 762.0
LW 756.0
Grand M.936 LW 750.0
Rapids
of
The
M.937
Saskatchewan
River
LW 738.0
Raised Water
LW 724.0
M.138
LW 727.0
LW 720.0
LW 741.0
Concrete Dam

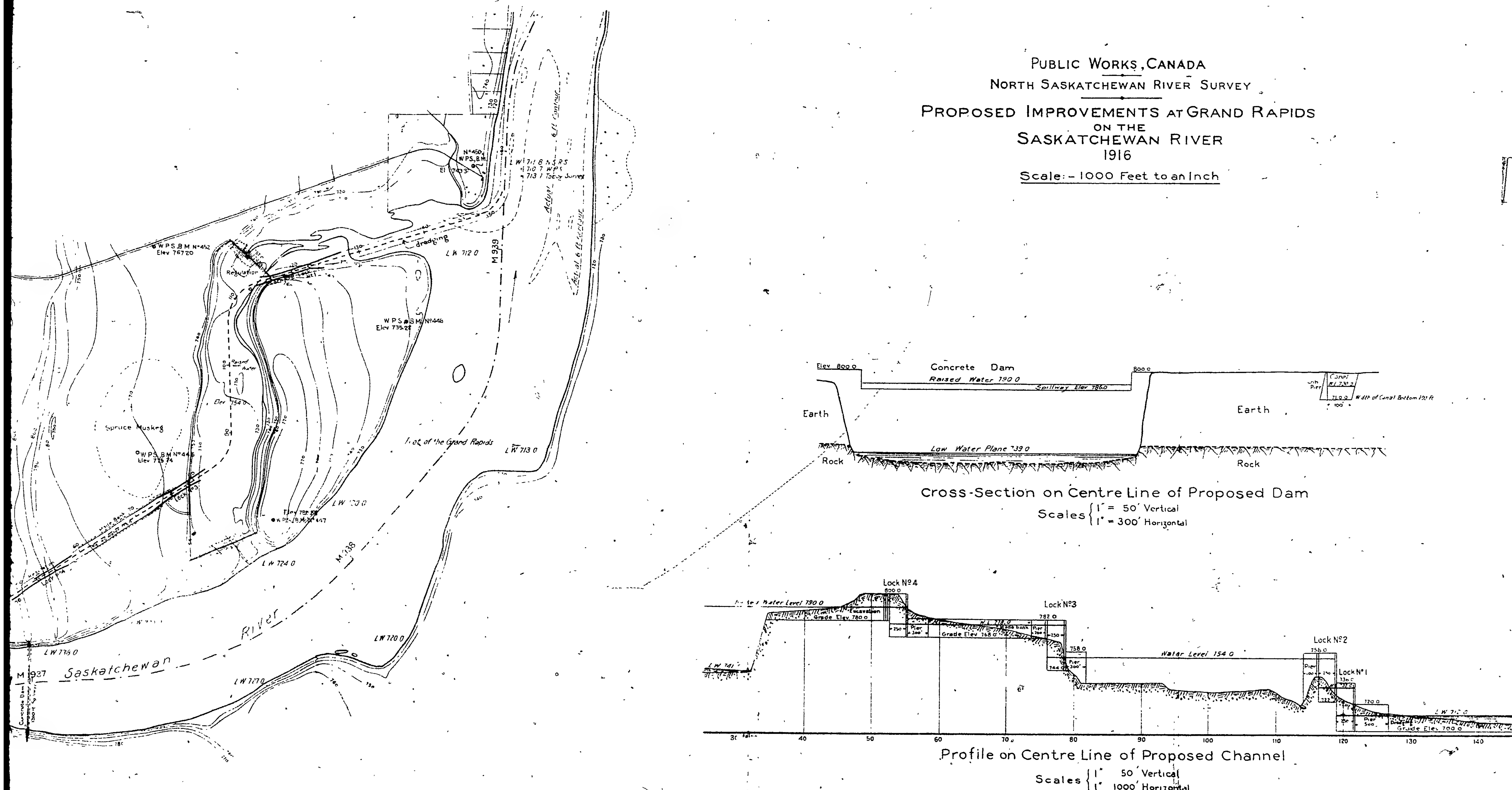
2 of 2

PUBLIC WORKS, CANADA

NORTH SASKATCHEWAN RIVER SURVEY

PROPOSED IMPROVEMENTS AT GRAND RAPIDS ON THE SASKATCHEWAN RIVER 1916

Scale:- 1000 Feet to an Inch



Cross-Section on Centre Line of Proposed Dam

Scales { 1" = 50' Vertical; 1" = 300' Horizontal

Profile on Centre Line of Proposed Channel

Scales { 1" = 50' Vertical; 1" = 1000' Horizontal

entrance, and in the raising of same to high water mark.

A small amount of dredging will be needed below the Lock. Excavation from the Canal prism, probably mostly rock, will afford the material for canal embankment west of Lock.

Plant, materials for construction, supplies, etc., may be brought up river by boat from the lower section, and laid down at the site of the Lock when works at Grand Rapids have been completed.

<u>Estimated Improvements at Red Rock Rapids.</u> The estimated cost of improvements at Red Rock Rapids amounts to $1,509,500.00. Items forming this sum are given in detail on the following page.

<u>Grand Rapids.</u>

<u>General.</u> A site for a dam which has been considered by the Water Power Survey, probably because of the narrowness of the river and good quality of the rock, is situated at Mile 935¾ (Plate 59).

It does not appear how a dam at this site will overcome anything except the most concentrated fall of the Grand Rapids, nor that it will be able to drown out the Red Rock Rapids without carrying wing embankments so far as to render the cost of such works prohibitive. The location of a power house, ¼ of a mile below the dam, on the other hand, is both suitable and safe.

The desirability of building a dam to utilize the greatest amount of head possible for power development, whilst reducing the cost of improvements to navigation to a minimum, has led to an adoption of an alternative site further down River, at Mile 937, as shown on Plate [illegible]. The river here, is 1,200 feet in width, and the Low Water surface 739 (N.S.R.S. datum). The greater length of spillway at this site would provide an element of safety, the estimated discharge with a 4 foot head, being double the discharge recorded as a

NORTH SASKATCHEWAN RIVER SURVEY

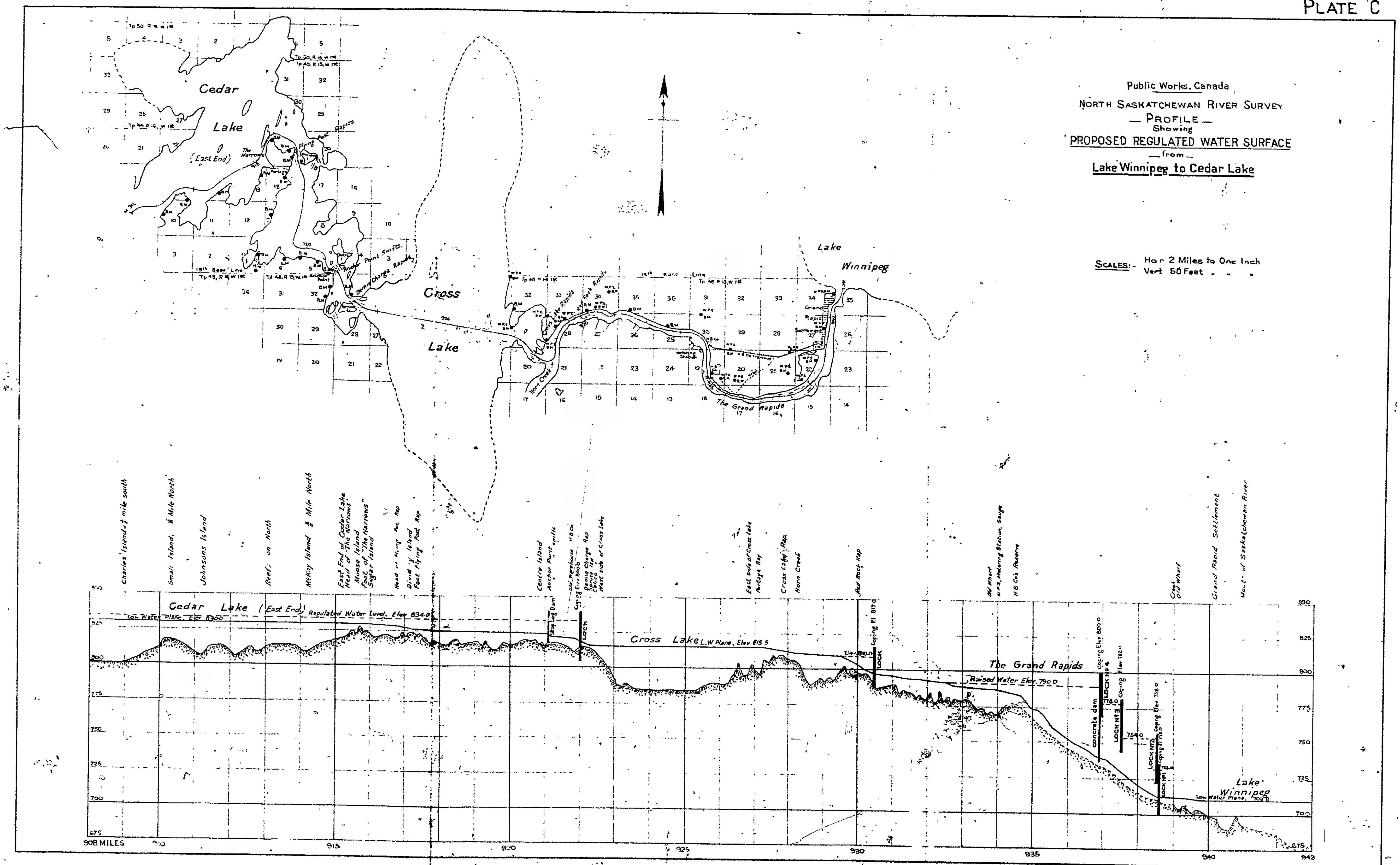
PRELIMINARY ESTIMATE

FOR IMPROVEMENTS AT RED ROCK RAPIDS

Canal and Lock - Lift 14 Ft

DESCRIPTION	QUANTITIES Cu.Yds.	PRICE	COST	TOTAL
Canal above Lock				
Excavation Solid Rock wet	63,000	3.00	189,000	
" " " dry	244,900	2.00	489,800	
Crib Entrance Pier	8,500	3.00	25,500	
Upper Entrance to Lock				
Crib Entrance Piers 700 L.Ft.	6,000	3.00	18,000	
Lock				
Excavation in lockpit Solid-Rock dry.	17,000	2.00	34,000	
Concrete in Lock.--Backfilling around lock and -works	31,900	10.00	319,000	
	10,000	.35	3,500	
Lockgates (4 Pairs).		11,000	44,000	
Valves and machinery			12,000	
Operating machinery for lock			8,000	
Lock houses, surfacing, bollards, lights, etc			8,000	
Lower Entrance				
Crib Entrance Piers 700 L.Ft.	6,000	3.00	18,000	
Excavation Solid Rock dry	8,000	2.00	16,000	
" " " wet	62,000	3.00	186,000	
Creek Diversion				
Excavation Loose Rock dry	2,000	.75	1,500	$1,372,300
				$1,372,300
Engineering & Contingencies, 10%				137,200
Total........				$1,509,500

PLATE C



Public Works, Canada
North Saskatchewan River Survey
— Profile —
Showing
Proposed Regulated Water Surface
— from —
Lake Winnipeg to Cedar Lake
Scales:- Hor 2 Miles to One Inch
Vert 50 Feet
Cedar Lake
(East End)
The Narrows
Flying Post Rapids
Anchor Point Swifts
Demi Charge Rapids
Cross Lake
Red Rock Rapids
Horn Creek
The Grand Rapids
Grand Rapid Settlement
Lake Winnipeg
13th Base Line
14th Base Line
Cedar Lake (East End) Regulated Water Level. Elev 834.0
Low Water Plane, Elev 830.0
Cross Lake L.W Plane, Elev 815.5
The Grand Rapids
Raised Water Elev. 790.0
Lake Winnipeg
Low Water Plane 709.0
LOCK
LOCK No 4
LOCK No 3
LOCK No 2
LOCK No 1
concrete dam
908 MILES
910
915
920
925
930
935
940
943

maximum at Grand Rapids in the year 1912.

The profile shows relatively slack water with medium depth. Danger from high water during construction is not so great as at the site above. A dam at this site, as compared with the one projected in connection with the development at the upper site, will save at least a mile of canalization.

The location for a Power House here is not ideal, but no doubt, a satisfactory site may be had by excavating into the bank.

Dam and Lockage System. A concrete dam at Mile 937, raising the water 51 feet, with a series of 4 locks and Canal, such as shown on Plate C-6, is recommended for the improvement of the Grand Rapid Section. The locks are to be constructed for the following lifts:-

Lock No. 1 -	From Elev.	712	to Elev.	732 -	Lift	20 Feet
" No. 2 -	" "	732	" "	754 -	"	22 "
" No. 3 -	" "	754	" "	778 -	"	24 "
" No. 4 -	" "	778	" "	790 -	"	12 "
					TOTAL Lift	78 Feet

Locks to be of concrete, 250 feet between sills and 50 feet wide with 10 feet of water on sills. Entrance piers of cribwork under water with concrete walls above. Canal to be 100 feet wide at bottom and 10 feet deep. A large basin between Locks Nos. 2 and 3 will be formed by two embankments, from waste material, extending across both ends of an old dry channel, as shown. Stop log regulation will permit of the unwatering of the basin, when necessary.

Estimated Improvements at Grand Rapids. The estimated cost of works at Grand Rapids amounts to $3,764,570.00. Details of this estimate are given on the following page.

Summary. The total cost of improvements outlined above amounts to $20,765,591.00 approximately. The several amounts forming this total appear in the Summary, page 83.

NORTH SASKATCHEWAN RIVER SURVEY

PRELIMINARY ESTIMATE

FOR IMPROVEMENTS AT GRAND RAPIDS.

DESCRIPTION	QUANTITIES Cu.Yds	PRICE	COST	TOTAL
Concrete Dam				
Length 1700' Spillway 1200'				
Concrete	97,440	10.00	974,400	
Earth Excavation dry	19,200	.50	9,600	
Solid Rock " "	39,200	2.00	78,400	
Unwatering Bulk Sum			200,000	$1,262,400
Canal & Four Locks				
Locks Nos. 1 & 2. (In flight)-250'x50' each.				
Upper Entrance Piers-Crib (500 L.Ft)	11,110	3.00	33,330	
Excavation dry in Lockpit #2	15,000	.60	9,000	
" " " " #1	25,000	.60	15,000	
Concrete in Lock No. 1	33,000	10.00	330,000	
" " " 2	33,000	10.00	330,000	
Lower Ent.Piers Crib-700L.Ft.	7,780	3.00	23,340	
Lockgates (3Pairs)		10,000	30,000	
Valves & Machinery			12,000	
Unwatering Lock No.1-Bulk Sum			5,000	
Operating machinery for locks			36,000	
Lock houses, surfacing, bollards, lights			32,000	
Backfilling around locks and works	60,000	.35	21,000	
Channel below Lock No. 1 (12 Ft. below L.W. at Lock to 6 Ft. at Sta.144)				
Earth Excavation	74,000	.35	25,900	
Solid Rock "	25,000	2.00	50,000	
Earth Dam with Concrete Core Wall near Lock #2.				
Earth fill	95,000	.60	57,290	
Concrete Core Wall & Regulation (stop log)	8,850	10.00	88,500	
Earth Dam with Concrete Core Wall So. of Lock #3				
Earth fill	31,700	.60	19,020	
Concrete Core Wall & Regulation (stop logs)	3,770	10.00	37,700	$1,155,080
Lock No.3 (250'x50')				
Crib Entrance Piers (1000L.Ft)	8,660	3.00	25,980	
Excavation dry in Lockpit	25,000	.60	15,000	
Concrete in Lock	37,900	10.00	379,000	
Lockgates (2 Pairs)		10000	20,000	
Valves & Machinery			8,000	$ 447,980
			Carried Forward	$2,865,460

REPORT

OF THE

SURVEY OF THE NORTH SASKATCHEWAN RIVER FROM EDMONTON TO LAKE WINNIPEG

1910-15

BY

L. R. VOLIGNY, C. E.

VOLUME 2 OF 3

NORTH SASKATCHEWAN RIVER SURVEY

PRELIMINARY ESTIMATE

FOR IMPROVEMENTS AT GRAND RAPIDS (Continued)

DESCRIPTION	QUANTITIES Cu. Yds	PRICE	COST	TOTAL
			B.F.	$2,865,460
Channel between Lock No. 3 and Lock No. 4				
Earth Excavation to be used in embankment. Price includes overhaul	53,000	.50	26,500	
Solid Rock Excavation	26,500	2.00	53,000	
Embankment - borrow -	10,000	.35	3,500	
Regulation (stop log)			5,000	$ 88,000
Lock No. 4 (250'x50')				
Crib Entrance Piers(1000L.Ft)	8,660	3.00	25,980	
Excavation dry in lockpit &	50,000	.60	30,000	
Concrete in Lock.- regulation	28,000	10.00	280,000	
Lockgates (3 Pairs)		10,000	30,000	
Valves & Machinery			12,000	$ 377,980
Channel above Lock No. 4 100' wide and 10' deep.				
2 Cribs 20 x 40	600	3.00	1,800	
Earth Excavation	66,000	.35	23,100	
Solid Rock	33,000	2.00	66,000	$ 90,900
				$3,422,340
Engineering & Contingencies, 10%				342,230
Total				$3,764,570

NORTH SASKATCHEWAN RIVER SURVEY.

SUMMARY OF
ESTIMATED COST OF NAVIGABLE WATERWAY
FROM EDMONTON TO LAKE WINNIPEG.

Channel (Edmonton to Le Pas, 150 Ft. wide, 6 Ft. deep
(Le Pas to Lake Winnipeg, 150' " 10 Ft. "

WORKS	ESTIMATED COST
Dredging	$ 4,839,597.00
Diversion and Bank Protection Works (Edmonton to the Sturgeon River "Cut Off")	1,360,674.00
To complete City of Prince Albert's Lock and Dam at La Colle Falls	325,000.00
Locks and Dam at "The Forks"	2,779,470.00
Locks and Dam at the Tobin and Squaw Rapids	4,349,380.00
Canal, Lock and Dam at the Demie Charge Rapids	1,837,400.00
Canal and Lock at the Red Rock Rapids	1,509,500.00
Canal, Locks and Dam at the Grand Rapids	3,764,570.00
GRAND TOTAL	$20,765,591.00

POWER AND STORAGE.

POWER AND STORAGE.

General. The production of power on the North Saskatchewan River is both limited and costly. It is limited by the extreme low winter flow, which may be taken as about 1000 second feet at Edmonton, and by the relatively low head available at the foot of the various falls or rapids, and costly owing to the necessity of constructing works designed to provide adequate storage and to be safe against a flood discharge of 200,000 second feet.

It is of doubtful utility to establish storage reservoirs in the Mountains with the sole idea of supplementing the low winter flow, for owing to the nature of the bottom, particularly above Edmonton, and the liability to the formation of frazil and anchor ice with backwater, overflow and surface freezing, a good percentage of this water will be lost before it reaches the turbines. Such storage, however, may be carried out in connection with flood control and the River improvement scheme, and will prove valuable to Power interests along the River as a means of equalising, to an appreciable extent, the head available throughout the whole of the year.

With two exceptions, namely, the sites at Pakan, and at the foot of the Tobin and Squaw Rapids, the storage of water at possible Power Sites below Edmonton appears impracticable. Even the "La Colle Falls" development for the City of Prince Albert, which, half finished at a cost of $900,000.00, and likely to cost in all $2,000,000.00 if completed, offers only 3,000 guaranteed horse power at low water and provides for practically no storage whatever.

As the ordinary river craft are not prepared to cope with velocities of 8 to 10 miles per hour in working up stream, it may reasonably be expected that such Power schemes as may by Locks and Dams improve the navigability of the River at the several Rapids, will be given substantial assistance from

the Dominion Government. If the Rapids which occur at intervals for 150 miles below Edmonton, and again below Prince Albert, are to be effectively improved by private interests, it is evident that the cost not of the Locks alone, but a large share of the cost of the Dams as well, is properly chargeable to river improvements.

Pakan Power Site. A site exists about 75 miles from Edmonton in the Pakan sandstone ledges, where it may be possible not only to build a dam 75 feet high above low water surface, with two locks, but also to secure thereby a storage of 200,000 acre feet.

During three months this storage might be so manipulated as to provide works in the river below - such as Prince Albert has undertaken - with the water that would assure an extra 1000 Horse Power along its route, without lowering the capacity of a plant established at the dam itself to less than 4000 Horse Power for the entire year. This means that 4000 H.P. could be readily delivered at Edmonton by a 75 mile transmission line all the year around. Substantial Government aid, however, would be required in order to assure Edmonton the power at an attractive rate, say of $50.00 a Horse Power.

Moose Rapids Site. Though the proposed navigation scheme does not call for an improvement of the rapids between Hopkins and Moose by means of Locks and Dams, should the construction of such works be undertaken later, a substantial amount of Power - probably from 3,000 to 4,000 Horse Power - would be available at the foot of the Moose Rapids. No considerable storage, however, is possible here, as in the case of the Pakan Site.

The nearest market for this power would be in the St. Paul des Metis District, some 35 miles distant.

Moose Rapids are about 160 miles from Edmonton.

<u>Site at "The Elbow".</u> Storage, combined with marked improvement in navigability, can be secured at "The Elbow". In the district between Battleford and "The Elbow", the wide river bed and high banks are well adapted for storage purposes By raising the water some 35 feet at The Elbow, a very large reservoir, about 70 miles in length, would be formed, and woul serve the interests of both navigation and Power as well.

The works at this point, in order to deal effectively with the large quantities of silt carried by the water, would have to be provided with a number of sluiceways similar to those on the Assouan Dam on the Nile or a succession of Stoney Gates. They would be of distinct advantage to the Prince Albert plant, raising its capacity from say 3,000 H.P. to 5,000 H.P. and would also serve Saskatoon or Battleford with some 5,000 Horse Power.

The cost of a dam at "The Elbow" would however, be so high as to offset the advantage in navigability and power derived through the construction of works of that kind.

<u>"La Colle Falls" Development.</u> The Hydro-Electric Plant of the City of Prince Albert is located on the North Saskatchewan River, 29 miles below the City. At this point there is a total fall of 19.4 feet in 3 miles of River. The first five Rapids of the La Colle Falls series occur in this three mile reach.

The obtainable Power at the site, originally estimated at about 11,200 Horse Power, cannot be said to exceed 3,000 effective Horse Power. Systematic meterings conducted at Prince Albert since 1911 give an average minimum winter flow of from 1,000 to 1,500 c.f.s. and in one instance, in 1914, a flow as low as 850 c.f.s. is on record. These figures show that in low water years no more than 2,000 E.H.P. can be depended upon for delivery at the city sub-station during the three winter months.

The following description of the Plant, taken from the Report of the J. G. White Engineering Corporation, New York, the Experts engaged by the City of Prince Albert to report on the development, will give a general idea of the main features of this undertaking:-

"The plant as laid out consists of a diversion dam, at "the South end of which is a lock for navigation purposes. "At the north end of the dam is the intake structure. This "controls the entrance of water to the canal, which is located "along the northerly side of the river, and generally about "800 feet away from it. The power house is located on the "canal about 2,000 feet below the intake, and is connected "again to the river by a tail race about 1,650 feet long. (See "Plate C-1).

"The dam is a hollow concrete structure of the Ambursen "type having a length of spillway of 755 feet, and is about "30 feet high above the bottom of its foundation, raising the "water in the river about 20 feet. Provision is made for "raising the water an additional two feet by flashboards. The "total base width of the dam is 119 feet, of which about 66 "feet is a concrete apron below the dam. The dam is divided "into 50 bays, each having a usual length of 15 feet from the "centre to centre of buttress. Six 8'x12' Stoney sluice gates "are to be placed in alternate bays at the bottom of the dam "at its northerly end. The dam is founded on a very hard clay "in which are buried occasionally small boulders.

"The lock is a massive concrete structure designed for "a lift of 23 feet at working water level. The lock chamber "has an available length of 135 feet, and is 40 feet wide. "The total length to the ends of the shore retaining walls is "506 feet.

"The intake structure is of reinforced concrete 179 feet "long, flanked at each end by extensive retaining walls. "Provision is made for eight openings, each 18 feet wide, which

"are to be controlled by stop logs. Suitable racks are "provided for and a reinforced concrete hood is to be "constructed across the openings so that the water will enter "5½ feet below the normal water surface.

"The canal is about 2,000 feet long, with a base width "of 58 feet and side slopes of two horizontal to 1 vertical. "The capacity of the canal, with water 15 feet deep and a slope "of 1 foot in 2,000 feet as proposed, will be about 8,300 c.f.s., "when free from ice, and about 4,500 c.f.s. when covered with "three feet of ice. The slope in the canal when carrying "sufficient water (about 2,000 c.f.s.) for the initial "installation, will be about three inches in its length of "2,000 feet, and the velocity of flow about 1.5 feet per "second.

"The power house is designed to accommodate three turbine "units of 2,500 horsepower, with the necessary generators, "exciters, transformers, switchboards, etc. The building will "be of concrete construction and only two turbines will be "installed in the initial installation.

"The tail race is about 1,650 feet long with a base "width of 46 feet, and side slopes of two horizontal to one "vertical for a depth of 15 feet, above which the slopes are "1½ horizontal to one vertical. The tail race as laid out "has sufficient capacity to carry the 2,000 c.f.s. required "for the initial installation of 5,000 horse power when free "from ice, but unless the channel erodes, some head will be "lost when it is covered with ice.

"In the initial installation it is proposed to install "two turbines of the vertical type of 2,500 horse power each. "At 80 per cent efficiency and with 28 feet of head about "2,000 c.f.s. of water will be required to operate these "turbines. Allowing for losses at generator, step-up and step- "down transformers and for transmission, about 4,000 E.H.P. "(24 hour power) will be available at the Prince Albert "sub-station when there is sufficient flow in the river.

Work on this development was started during the summer of 1912, and closed down owing to lack of funds, on August 29th, 1913. Construction work completed on that date amounted to about 40 per cent of the entire works. The cost of the completed Power Works will exceed $2,000,000.00.

Power at "The Forks". Of the 90 feet of drop in 12 miles to be negotiated throughout the entire series of La Colle Rapids, a good 60 feet remains after making adequate allowance between tail race of the Prince Albert Development and a pond level at "The Forks", 9 miles further down river, to initiate another development.

The Works designed for navigation improvements at the Forks, shown on Plate C-2, provide for this development. With a minumum flow of 1,000 cubic feet per second all year and a working head of 40 feet, the development of 3,300 Efficient Horse Power is possible at this site.

Practically no storage is available in the reach, the valley being narrow and winding and confined everywhere within high clay banks.

Just below the foot of these rapids, the South Saskatchewan flows in with a practically equivalent watershed, and a minimum winter flow likewise of 1,000 second feet.

Cadotte & Nipawin Rapids. The possible power site at Mile 594½ examined by the Dominion Water Powers Branch, would not appear to be very satisfactory; the same may be said of site at Mile 595½ unless a dam at this site were combined with another dam lower down. Ice appears to have considerable action at the first named site but is in less evidence on the lower Rapids.

A dam 1,500 feet long at Mile 599½, Chart No. 40, will make a great amount of storage available. The water may be raised to Elevation 1076 by this dam, and all high water is provided for at the site.

No other dam site on the Nipawin Rapids will render any considerable amount of storage available. An Elevation of 1052 on the middle or lower Nipawin will however drown out the Cadotte Rapids. Such a dam near Mile 597 would by canalization, provide an extra 5 feet of fall, but at a greater expense than a dam at Mile 598 carried to the same Elevation 1052 and overcoming all rapids. Canalization to shallow depth might however be employed at Mile 597 to take care of possible high water.

Either of these dams would be 1,200 feet long.

The range between high and low water may be generally taken at 15 feet in this section of River.

Tobin and Squaw Rapids. The only other Rapids which offer a heavy obstacle to navigation in the Saskatchewan between Prince Albert and Le Pas, are the Tobin and Squaw Rapids, 150 miles below Prince Albert. At these rapids the river is very shallow and drops some 38 feet in 7 miles, the current in spots running from 8 to 10 miles per hour.

As a power proposition in connection with navigation improvements, this site will yield, figuring on a 75% efficiency, a minimum of 5,000 Electrical Horse Power, with a minimum flow of 2,000 c.f.s. all year and a working head of 35 feet.

The basin created by raising the water at the foot of the Squaw Rapids, as shown on Plate C-3, will provide a large amount of storage.

By taking advantage of a couple of short ridges on the north bank, excavation will allow of an intake at right angles to the river, and provide protection and shelter for a Power House and Tail Race.

The absence of a ready power market within a reasonable distance and transmission line expense, would indicate that as a commercial enterprise, a development at this site is unadvisable for a number of years to come. A pulp mill could

be established nearby, as there are large areas of timber presumably of paper making grade in the neighbourhood.

Demie Charge, Red Rock and Grand Rapids. The three power sites on the Lower Saskatchewan between Cedar Lake and Lake Winnipeg, namely:- the Demie Charge Rapids, the Red Rock Rapids, and the Grand Rapids, will be adversely affected by the Pasquia Reclamation project of the Dominion Water Power Branch which involves the lowering of Cedar Lake some 12 feet. At the Demie Charge, the loss of head alone will render the site practically useless as a power proposition, whilst developments at the Red Rock and Grand Rapids will suffer considerably owing to ~~diminished~~ lesser storage in Cross Lake.

As a storage reservoir, Cedar Lake offers an area of approximately 425 square miles at present. Moose Lake, which flows intermittently into Cedar Lake, has an approximate area of 513 square miles. The combined capacities of these reservoirs therefore amounts to some 938 square miles. The eliminating of a large percentage of this storage by the lowering of Cedar Lake will materially reduce the capacities of Plants further down river, notwithstanding the possible storage in Cross Lake with its area of 39 square miles.

At the Demie Charge, under present conditions, a development of 4,000 to 8,000 Horse Power is possible, depending upon the stage of Cedar Lake.

Assuming a minimum flow of 3,000 sec. ft., the Red Rock Rapids will provide 3,750 Horse Power by raising the water 15 feet at the foot of the Rapids. A dam at this point, however, is not contemplated in connection with navigation improvements.

As the waters stand now, Grand Rapids with a fall of 60 feet in 4 miles, and a minimum flow in this part of the Saskatchewan of probably 3,000 second feet, should provide from 15,000 to 25,000 Horse Power, irrespective of any allowance for storage in the Cedar and Cross Lakes.

APPENDIX "A"

ESTABLISHMENT OF LOW WATER PLANE

By G. P. MORSE
Assistant Engineer.

APPENDIX "A"

ESTABLISHMENT OF LOW WATER PLANE.

By G. P. Morse
Assistant Engineer.

The establishment of a Low Water Profile over 900 miles of River is a matter of considerable difficulty. That such an undertaking should or could be related in any way to flood conditions is not at first apparent.

Mention has been made of the diversion of the waters now flowing from the Cut Off into Cumberland Lake, whence mingled with the waters of many streams they issue by two more (the Bigstone and Tearing River Outlets) to join their proper Channel at widely separated points. Changes of general Profile are moreover introduced by various series of Rapids, of which the Colle Falls series present the greatest obstacles to navigation - except Grand Rapids. The South Saskatchewan, dra~~w~~ining an approximately equivalent watershed, is met by the North River at the foot of these Rapids and the enlarged stream has its flow through a very sparsely settled country for the next 200 or 300 miles.

The greatest difficulty was encountered in establishing permanent gauges and getting same read at proper intervals. Gauges have been set and carried away by floods repeatedly in a single season. The only boat available for the work of setting gauges was the small oil launch "Lafleur" which was also depended upon for provisioning parties operating over various sections.

The ideal method of establishing a Low Water Profile is well known. It consists in the placing of a gauge, self-recording, every ~~2~~ few miles or so along the Rivers' gentler reaches, and one at the top and bottom of every Rapid and every Lake-like expansion; also at the beginning and end of every well-defined separation of channels, all tied in

to a set-

to a set of precise levels;- and the securing of these readings, with adequate inspection, over a period of many years.

Needless to say, such an expensive scheme was not attempted in connection with this Survey; the information on River Profile accompanying this report is therefore of a somewhat approximate character. It has however, been the aim to establish a profile that would be correct within one foot; and if care be exercised in not dredging the wier-like clay bars too deep while work is in the experimental stage, it is believed that this Profile will serve its intended purpose.

We have indeed a system of precise levels from Edmonton to Le Pas reduced to a datum of our own (2000 assumed) at Edmonton; and for some stretches of two hundred miles these benches are found not more than two miles apart, while at the time of placing the benches water-elevations were recorded and in connection with gauges at supposedly governing points, these formed the basis of an approximate low water profile for the year 1910. I may say that the water was normally low in the latter part of the 1910 season reaching 2001 at Edmonton on November 1st., and although we have no intention of assuming that it is absolutely the lowest stage the River above the Forks has ever shown on November 1st., the figure 2000 being one foot lower at Edmonton, has been adopted as the basis of our Low Water Profile there; likewise at Vermilion, Battleford, Prince Albert, and wherever else gauges have been located above the Forks, the 1910 water less one foot has been adopted. This was justified in subsequent years.

In 1910 we were able to establish only 9 permanent

gauges in the -

gauges in the 900 miles between Edmonton and Lake Winnipeg. The boat Lafleur gave poor satisfaction that year and was re-modelled the following winter. The gauge at the Forks went out and was not read to the Low Water Season. The water readings taken by the Level Party therefore gave no adequate idea of the Low Water Plane below the Forks in that year. The Pas Gauge read 847.1 at end of season which is 1.1 higher than the Low Water we have adopted for that point. But in 1911, when gauges above the Forks showed practically low water stage, the Pas showed 4.0 ft. above the adopted L.W.P. and Pemmican Portage gauge in the Main River opposite Cumberland showed 4.5 higher than the Low Water Plane there which has been fixed at 861.4.

The year 1912 showed Prince Albert 1370.1 on November 1st., being 0.1 above adopted Low Water. The corresponding reading for Le Pas was 6.0 above L.W.P. 846.0

It is evident that a part of these differences may be attributed to the effect of the South Branch, but late in the season they are probably due to the so called "North" water that comes in from Cumberland Lake.

Again in comparing the gauge books from Edmonton and Battleford it was evident that the extreme rise (or fall from flood elevations) was only about half at Battleford what it was at Edmonton. Yet no large tributary stream intervenes.

Hence even with the taking of water elevations at close intervals as in 1910 an interpretation by the gauges of these two places would show wide discrepancies at Low Water Plane, and interpolation is the usual resort. This however, is believed to be less accurate than the method we finally adopted.

Briefly the suggested method of gauging for Low Water Plane is this:- Conduct a continuous gauge from Camp to Camp as the Sounding Crew progresses down River, reading gauge immediately before leaving and immediately after setting camp, the effect being that of a series of Gauges about 4 miles apart. This natural combining of the effects of altered channels and banks and grades will be found to give a more consistent profile for long distances, when the gaugings are applied to water levels run from benches, than can be produced by adjusting between single gauges separated by the entire distance, and the method is adaptable to various emergencies. It is believed that for these increments of distance the gauges may be equated, being read for considerable periods at the successive stations, with a short time intervening between stations.

A few remarks will be made on the detail of the method.

The gravel banks of the Saskatchewan in this District and the buoyancy likely to affect an insecure gauge both require that the gauge stick be shod with a heavy pointed iron. Two or at most three gauges may be set, marked to tenths, and in the work being carried on, the one may be considered a check on the other, as through lack of instrument men it may be inconvenient to have the zero checked by levels to temporary benches twice for each move. Two books are kept one by the Sounder, and Cook, independently.

Although the method as worked out is believed to be more accurate in periods of high water than the system of adjusting intermediate river levels by interpolation between widely separated gauges taken for the same dates, it is of course increasingly accurate according as the entire system

of readings-

of readings be taken near the actual low water stage.

<u>Where the general slope of the River becomes greatly changed</u> it will, as with the other method, be necessary to instal a new permanent gauge, but not for short breaks in the general grade.

The following is a sample page from Sounder's Gauge Book:-

Aug. 15/13 Sta.	B.S.	Int.	F.S.	H.I.	Elevn.	Entries in Level Book made by Asst. Engineers.
B.M. 176	1.28			1399.29	1398.006	Thus:-
old No.47	(1.28)			(1399.29)		1373.65 W.S. 11 A.M.
			11.89		1387.40	-9.00 Camp Gauge 11 A.M.
			11.61		87.68	1364.65 Camp Gauge Zero
	0.64			88.04		9.10 Camp Gauge <u>Noon</u>
	0.36			88.04		1373.75 Noon water Aug. 15th
			11.37		76.67	3.70 Continuous Gauge <u>Noon</u>
			11.28		76.76	1370.05 L.W.P.
	5.56			82.23		
	5.46			82.22		
W.S. at 11 A.M.		8.58			1373.65	1373.65 W.S. 11 A.M.
						03.6 Cont. Gauge at 11 A.M.
						1370.05 L.W.P., Otherwise
G.P.M.						

TABLE I.

I. Date	II. Time	III. Height of Water on Camp Gauge	IV. Camp Number	V. B.M. No.	VI. Noon Reading read or estm'td.	VII. Zero of Gauge	VIII. Elevn. Water	IX. Reducing Reading	X. L.W.P.	XI. Remarks.
1912	H.M.									
May 23	2.15 P.M.	8.1	E.L.Co.	B.M.No.1	(8.2)	1995.7	2003.9	3.9	2000.00	Adopted.
" 24	12. M.	7.9	"	" No.1	7.9		2003.6	3.6		Moved after dinner
" 24	5. P.M.	3.4	Camp No.2	" No.3	(3.5)	1992.0	1995.5	(3.6)	1991.9	Levels 25th.
" 25	7. A.M.	3.3	" No.2	" No.3						
	12. M.	3.2	" No.2	" No.3	3.2		1995.2	3.3	1991.9	
	7. P.M.	3.1	" No.2	" No.3						
" 26	7. A.M.	2.9	" No.2	" No.3						
	12. M.	2.9	" No.2	" No.3	2.9		1994.9	3.0		Rain.
	7. P.M.	2.85	" No.2	" No.3						
" 27	7. A.M.	2.9	" No.2	" No.3						
	12. M.	3.1	" No.2	" No.3	3.1		1995.1	3.2		Rain.
	7. P.M.	3.1	" No.2	" No.3						
" 28	7. A.M.	3.3	" No.2	" No.3						
	10. A.M.	3.5	" No.2	" No.3	(3.6)			3.7		
			(Setting)	" No.4		1988.1	1991.7	3.7	(1988.0)	See Level Book.
	11. A.M.	2.8	Camp No.3	" No.5	(2.8)	1986.17	1989.0	3.7	1985.3	Levels 29th.
	7. P.M.	2.95	" No.3	" No.5	(2.8)					
" 29	7. A.M.	3.3	" No.3	" No.5	(3.3)		1989.5	4.2	1985.3	
			(Setting)	" No.6					(1978.2)	See Level Book.
	12. M.	2.7	Camp No.4	" No.7	2.7	1971.23	1973.9	4.2	1969.7	Levels 30th.
	7. P.M.	2.75	" No.4	" No.7						

Column VI. Has to be estimated for a Camp left in the morning but is otherwise filled in by the "Camp" Gauge Book which is read for noon as well as morning and evening, the two books being compared at intervals.

" VIII. May be obtained from the Level Book for some specified time, but it is better to carry out the determination of gauge zero in the Level Book and then by summing Colums VI. & VII. obtain a figure for noon water elevation which will be representative of the water stage of that day.

" IX. Is obtained by equating the gauges of the successive Camps. It is a "noon" reduction.

The subtraction of Columns VIII. & IX. constructed as herein indicated makes the L.W.P. a permanent feature of the Gauge Books.

The L.W.P. at intermediate benches as Nos. 4 & 6 above may be copied from the Level Book.

TABLE II.

Construction of Column IX. "Reducing Reading" (Noon)

Gauge Zero. May 23rd. (Edmonton Traffic Bridge). 1995.7		DATE:-	1912 May 23	24	25	26	27	28	29	30	31	Jne. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
L.W.P. (Edmonton Traffic Bridge). 2000.0		Continuous Noon Reductions (Col. IX.)	3.9	3.6	3.3	3.0	3.2	3.7	4.2	4.0	3.8	3.4	3.1	2.7	2.6	2.3	2.0	1.8	1.6	1.4	1.3	1.6	2.7	2.5	2.4	2.5	3.4	3.9	7.4	6.9	6.4	5.8
		Continuous Gauge Begin (Col. VI.)	8.2	7.9	7.6	7.3	7.5	8.0	8.5	8.3	8.1	7.7	7.4	7.0	6.9	6.6	6.3	6.1	5.9	5.7	5.6	5.9	7.0	6.8	6.7	6.8	7.7	8.2	11.7	11.2	10.7	10.1
B.M. No. 1	Camp Edmonton	Read Col. VI.	8.2	7.9																												
" 3	Camp No. 2			3.5	3.2	2.9	3.1	3.6																								
" 5	" 3							2.8	3.3																							
" 7	" 4								2.7	2.5	2.3																					
" 8	" 5										2.5	2.1	1.8	1.4																		
"10	" 6													3.0	2.9	2.6																
"11	" 7															2.6	2.3															
"12	" 8																2.0	1.8	1.6													
"13	" 9																		3.0	2.8	2.7											
"14	" 10																				2.8	3.1										
"14	" 11																					3.1	4.2									
"15	" 12																						2.6	2.4								
"16	" 13																							2.6	2.5							
"16	" 14																								2.7	2.8						
"17	" 15																									2.5	3.4	3.9				
"17	" 16																											2.4	5.9			
"18	" 17																												1.9	1.4		
"19	Pakan 18																													2.5	2.0	1.4

It is regrettable that the Gauge figures for the year 1912 at Pakan were not available till June 15th; but taking the best efforts at establishing a Low Water Plane by interpolation between the inconsistent readings of Edmonton and Pakan in 1910, 1911 and 1912 according to the old time method, the following table is offered by way of comparing the reduction figures thus obtained for the water at the different bench marks, and our reduction figure by the continuous method, and also the readings of the gauges themselves when these latter are corrected for time.

TABLE III.

DATE 1912	Low Water Plane determined by Interpolation	Corresponding Reduction Figs.	L.W.P. (Continuous Method)	Reduction Gauge as in Col. IX Table I	Edmonton Gauge 1912 adjusted for time	Pakan Gauge 1912 adjusted for time
May 23	2000.0	3.9	2000.0	3.9	3.9	
24				3.6	3.6	
25	1991.5	3.7	1991.9	3.3	3.3	
26				3.0	2.9	
27				3.2	3.3	
28	1987.7	4.0	1988.0	3.7	3.8	
29	1985.2	4.3	1985.3	4.2	4.9	
30	1977.9	4.3	1987.2	4.0	4.7	
	1969.1	(4.6)	1969.7	(4.0)	(4.7)	
31			1962.0	3.8	3.9	
June 1				3.4	3.5	
2				3.1	3.0	
3	1955.4	3.0	1955.7	2.7	2.7	
4	1945.1	2.4	1944.9	2.6	2.5	
5	1935.0	2.3	1935.0	2.3	2.3	
6	1923.2	1.7	1922.9	2.0	1.9	
7				1.8	1.6	
8	1910.6	1.5	1910.5	1.6	1.4	

TABLE III. (CONTINUED)

DATE 1912	Low Water Plane determined by Interpolation	Corresponding Reduction Figs.	L.W.P. (Continuous Method)	Reduction Gauges as in Col. IX Table I	Edmonton Gauge 1912 adjusted for time	Pakan Gauge 1912 adjusted for time
June 9				1.4	1.3	
10				1.3	1.2	
11	1900.4	1.8	1900.6	1.6	1.6	
12				2.7	3.1	
13	1884.2	2.6	1884.3	2.5	3.2	
14	1877.2	2.3	1877.1	2.4	3.0	
15	1864.0	3.1	1864.6	2.5	3.1	3.0
16				3.4	4.0	4.0
17				3.9	5.0	5.1
18	1850.4	6.8	1849.8	7.4	8.5	6.8
19				6.9	7.2	6.6
20				6.4	6.5	6.1
21	1841.1 (Pakan M.77)	5.6	1840.9	5.8	5.8	5.6
The following (condensed analysis) closes with a 14 ft. stage at Brosseau (M.125)						
22	1828.4	5.2	1828.3	5.3		5.3
25	1814.1	5.9	1814.5	5.5		5.5
26	1807.2	5.6	1807.4	5.4		5.3
27	1803.4	5.6	1803.6	5.4		5.3
28	1797.6	5.4	1797.6	5.4		5.2
July 2	1794.1	4.2	1793.7	4.6		4.8
3	1783.3	4.3	1783.3	4.3		4.3
4	1779.0	4.1	1779.1	4.0		4.0
5	1772.0	4.4	1772.7	3.7		3.7
6	1764.6	4.1	1765.1	3.6		5.0
8			1756.5	4.8	(Brosseau) 4.6	5.0
9	1752.3	10.5	1752.0	10.8	?	7.2
10	1748.5	14.0	1748.5	14.00	14.0	?

The Brosseau Gauge was out from June 17th. to July 8th. and again on July 9th., but was reset July 10th. and remained till August 28th. only. It would be borne in mind that our figures in the third last Column are developed from Gauge Book notes as shown by Table II.

Notwithstanding the rapid rise of water to a total reduction figure of 14.0 feet, the Low Water Plane for Brosseau checked exactly with what was estimated from 1910 gaugings as the probable Low Water.

For some unascertained reason the 1911 readings at end of season at Brosseau were higher than the Edmonton readings of 1911 appeared to sustain, and raised a question as to whether the L. W. P. for Brosseau assumed from 1910 readings might not be too low. The estimate of dredging for the subsequent 20 miles was however lighter than any other previous stretch of equal length. Such gaugings as were had for June 1912 also indicated that the figure 1748.5 was to be relied upon as not too low. The remarkable agreement of the Plane established by our continuous gauge at this point (1748.5) has settled the matter.

Continuing therefore from Brosseau (M.125) to Bench Mark 47 below Hopkins (M.160) the Sounder's L.W.P. differs by 0.4 only from that worked out by interpolation of gauges and is likely to be fully as correct.

Over the entire distance of 160 miles from Edmonton it is safe to say that our determination of the Low Water Plane by a combination of methods would be correct certainly within 1 foot, having started with a stage of 4 feet at Edmonton. For the best results not only should all the bench marks be observed by the sounding party, but the levelling survey if made at the same time will furnish the best information as to other points on the River. See profile Plate "H".

168

Public Works, Canada

North Saskatchewan River Survey

— PROFILE —

Showing Low Water Plane

ADJUSTED FROM

CAMP GAUGES

NOTE. – Dotted Line shows Low Water Plane as determined by fixed gauges at Principal Stations.
Full Line shows Low Water Plane secured by Camp Gauges between Principal Stations

SCALES: Hor. 20,000 Ft. to an Inch
Ver. 20 " " " "

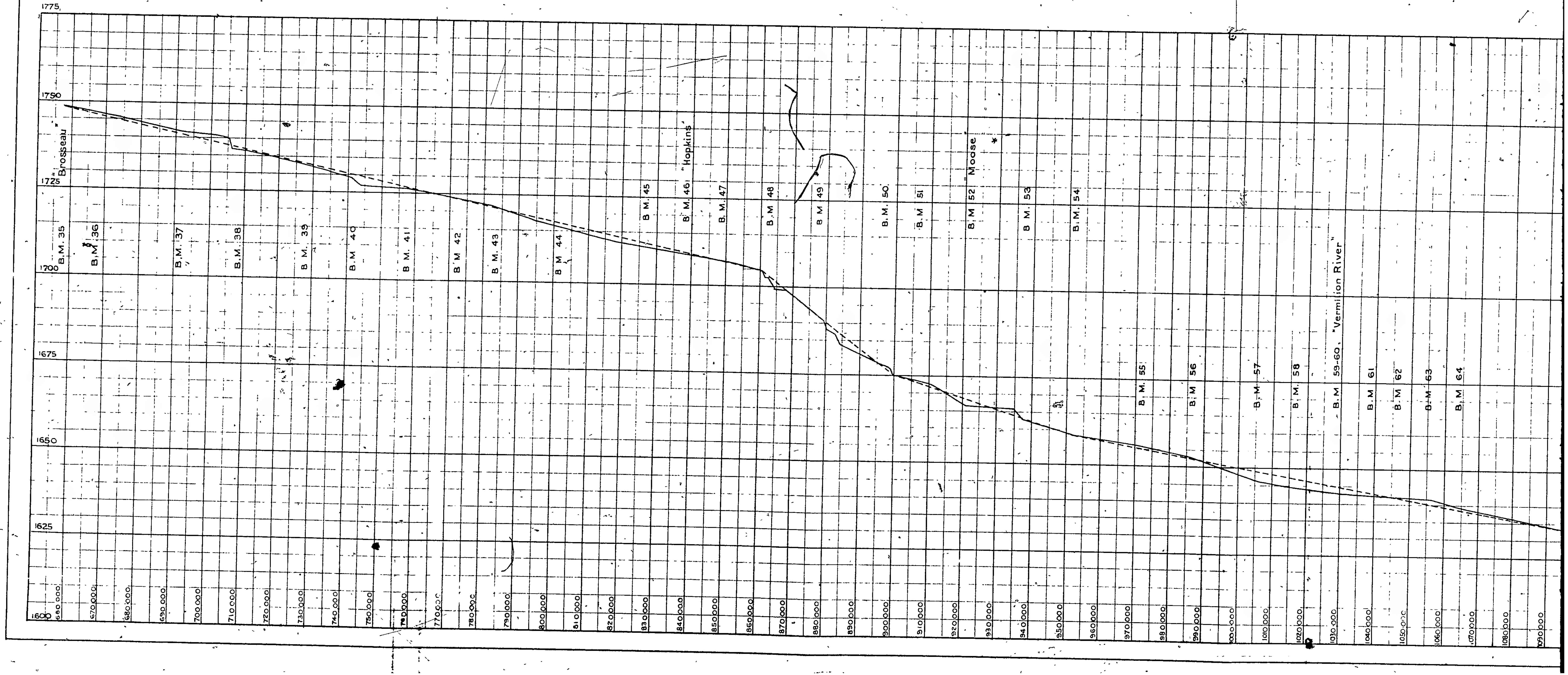


PLATE H.

2 of 2

Public Works, Canada

NORTH SASKATCHEWAN RIVER SURVEY

— PROFILE —

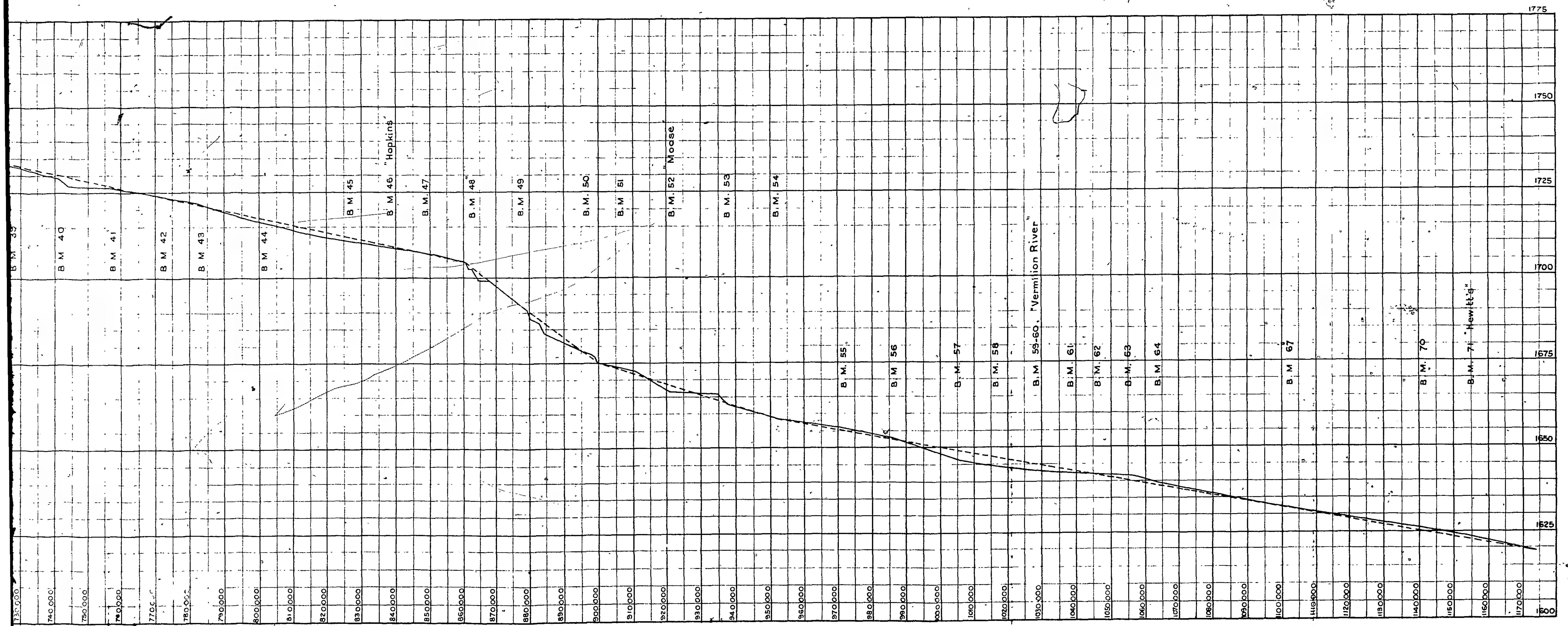
Showing Low Water Plane

ADJUSTED FROM

CAMP GAUGES

NOTE - Dotted Line shows Low Water Plane as determined by fixed gauges at Principal Stations.
Full Line shows Low Water Plane secured by Camp Gauges between Principal Stations

SCALES: Hor: 20,000 Ft. to an Inch
Ver: 20 " " " "



Just below Hopkins the character of the River Profile becomes so fundamentally altered involving a continuous series of rapids 10 miles in length, that it was no surprise to find that over this section and for the balance of the distance to Vermilion Gauge an adjustment of gauges had to be made.

The adjoining Profile, Plate "H" from Brosseau to Vermilion and beyond, will bring out the point we have to make, which is that while short stretches of Rapids do not in general affect this system of gauge reductions, a wier pitch with many miles of rapids or a long series of rapids followed by an almost dead level profile will necessitate some reference to another gauge. With the resumption of a generally uniform profile below Vermilion, the method of continuous gaugings remains the best, balancing, as it does, small irregularities in section and short changes in grade whether the general profile be steep or light.

Having established the value of this method for reasonable distances as being certainly as efficient as the method of interpolation of gauge readings applied to continuous water levels taken in any given year, the extension of the use of the continuous gauge to emergencies that may arise may now be shown.

1. If, as so happens, there is a stretch of many miles of "benches" on Prairie, no continuous water levels having been taken at the time these were established, then the method we have suggested which does not depend on the permanence of a single gauge nor on such previous water levels, is perfectly applicable for the determination of the Low Water Plane in any year that the Soundings may be taken and the water levels run from said benches.

2. If it is recognized that a gauge situated many miles above an important tributary cannot possibly indicate

the Low Water-

the Low Water Plane at the Junction nor at any point below, and a gauge having been located below the junction at a date subsequent to the beginning of Soundings on this stretch, (Fort la Corne being the only convenient locality 25 miles below the Forks for example), the Low Water Plane for this junction can be obtained by an application backwards of the Sounders' continuous gauge. This was done and established the Low Water Plane at the Forks as 1238.5 (November 1st, 1911).

3. From Fort a la Corne (65 miles below Prince Albert) no other gauge readings were available for the route sounded in 1911 down to mile 231, if we regard as inapplicable a gauge situated at one of the Outlets of the great Cumberland Lake, which lake received the major portion of the waters of the Saskatchewan below the Cut Off (M.178) our survey taking the other channel. But by the operation of the continuous gauge in 1911 and in 1914 the L.W.P. of the Cut Off 891.0 was deduced, being approximately 1½ feet lower than the water elevation taken there by the party of 1910, and if not too low, being certainly low enough.

4. Camp gauges need not be located at Bench Marks. Moreover the absolute gauge zero for the Camp gauge does not have to be known (Column VII. Table I.) Generally it may be said that if the Bench Mark is located within half a mile of the Camp, all that is necessary is to run the levels to the water once at this B.M. and assume that the fluctuations at the Camp gauges would be the fluctuations at the B.M. In 1913 particular care was taken to thoroughly test this method.

CONCLUSIONS.-

(a) It is probable, therefore, that by intelligent application of the continuous gauge method, the Low Water Plane can be established within a limit of one foot.

(b) If the method is faulty in the vicinity of a radical change in the general profile, any other ready method with gauges at rare intervals is certainly equally faulty. The imperative demand is for more gauges in such places, and self-recording gauges at that.

(c) Gauges on stretches of fairly constant profile need not be located closer than 50 miles for a preliminary investigation for the purposes of an estimate, and our continuous gauge method has been successfully operated over stretches running from 100 to 150 miles.

(d) The continuous gauge method is fairly applicable when continued through high water stages, but should not be started at extreme high stages and is naturally most accurate at low stages. Our work started at Edmonton in 1912 with a stage of 4 feet, reached 14.0 feet at Brosseau and was 7.5 at mile 160 with a probable error less than 1 foot.

From Fort a la Corne (M. 65 P.A.) with a stage of 6.7 on June 28th, 1911, we proceeded to the Cut Off (M. 178 P.A.) where the stage was 4.7 with an error certainly less than 1 foot (Aug. 10th, 1911) where Bench levels were made available.

(e) At sudden expansions of water the figure for reduction of soundings may properly be made smaller than other wise according to judgment; but without a radical alteration in the general profile this is not permanent, and the representative figures of Table II should be closely adhered to, modified for the working hours of the particular day only.

(f) This method of determining Low Water Plane, meets emergency conditions and hence should never be neglected. Not the least likely of such emergencies is the loss of gauges once located.

In 1913 particular care was exercised with the Camp Gauges in order to test the "continuous gauge" theory, with most satisfactory results. An application of the readings backward from Battleford to Bench 81 and thence through the 1912 readings to Vermilion River, checked the Low Water Plane at Vermilion as established by the Gaugings at that point for that year, no other record being available for the low stage.

Gaugings were carried from Battleford to Bench 119 (Maymont) arriving on May 29th, 1913: thence, after a month spent above Battleford, having re-levelled to the water surface at this Bench on June 27th, and continuing the Camp Gaugings to Prince Albert, 160 miles below Battleford, we checked the established Low Water Plane, there within two tenths (.2). The maximum stage was 6.1 feet.

Any discrepancies between this and subsequent profiles will most probably be due to failure of the Sounding Party in 1911 to make use of all bench marks and to derive therefrom sufficient water elevations; rather than to the dependence placed on the continuous gauge for reducing the elevations obtained.

APPENDIX "B"

GEOLOGICAL HISTORY OF THE NORTH SASKATCHEWAN RIVER BETWEEN EDMONTON AND CUMBERLAND LAKE.

By Mr. W. MALCOLM

G. S. C.

APPENDIX "B"

Geological history of the North Saskatchewan River between Edmonton and Cumberland Lake.

By Mr. W. Malcolm
G. S. C.

The course of the North Saskatchewan River has not received careful enough study to enable us to make a detailed statement of its geological history.

From Edmonton to the vicinity of Victoria the country is underlain by sandstones and shales of the Edmonton series. These are succeeded to the east by older Cretaceous shales extending to some distance below Ft. a la Corne. Underlying these and extending still further to the east are limestones and dolomites of Silurian age. Into these sediments the North Saskatchewan has cut its valley. The course of the river was determined by the general structural features of the rocks. The long stretch of river running in a south-east direction to the Elbow, follows the general direction of the eastern edge of the third or highest prairie level formed by the Eagle hills on the south side and the Thickwood hills on the north side of the valley. At the elbow the river descends to the second prairie level, and bending to the north-east, makes for the nearest point of its eastern limit, which it reaches about 45 miles below Ft. a la Corne. The direction of the two main branches of the Saskatchewan where they run approximately parallel for many miles is probably determined by the slope of this second prairie level.

Overlying the above mentioned Palaeozoic and Mesozoic sediments is a mantle of glacial drift. This was deposited by glaciers that had their origin in the area lying to the west of Hudson Bay and moved down across the prairie provinces

to some distance south of the international boundary. The deposits consist of transported material such as boulder clay, sand, gravel and clay, the boulders found at any locality consisting of fragments of rocks found in place at some distance farther north. This transportation by glaciers accounts for the occurrence of boulders of Palaeozoic limestone and Pre-Cambrian gneiss and greenstone along the Saskatchewan and southward. Glacial deposits ~~from~~ form the prominent ridges at The Pas and Big Eddy, as well as islands in Saskeram lake.

As the glacier retreated it blocked the northern and north-eastern outlets of many depressions. Temporary lakes were formed and in these stratified clays and sands were deposited. The most important of these glacial lakes was the one known as Lake Agassiz. This covered a large part of Manitoba and was formed by the impounding of the water by a tongue of the glacier lying between Manitoba and Hudson Bay. An arm of this lake apparently reached up the Saskatchewan a considerable distance and occupied a great part of the flat lying land that forms the low delta plain extending from the vicinity of Tobin rapids to Cedar lake. On the recession of Lake Agassiz to an elevation of about 900 feet in the vicinity it is probable that there still remained a lake whose eastern margin reached to the ridge at The Pas. On the further recession of this former lake, the outlet at The Pas was slowly worn down through the boulder clay and part of the original lake was drained. That the stratified lacustrine deposit is not of very great depth is shown by the fact that ridges of boulder clay remain unconcealed; of these the most prominent

are those through which the river breaks at the Barriere below Tearing river and at The Pas.

Throughout the delta plain the elevation of the land above the general river level is not more than 10 feet and in many places is much less, so that in periods of flood the river overflows its banks and new channels are sometimes formed.

About forty years ago, at a point 33 miles above Cumberland House, the river broke through the 2 mile wide barrier of low land separating it on the north from the channel of Candle river, a large stream draining Candle lake, and flowing in a course roughly parallel with the Saskatchewan into Cumberland lake. The break occurred during the period of the spring flood, the water following the course of an old canoe portage leading from one of the sharp northerly bends of the Saskatchewan to a southerly elbow of Torch River.

At first a small stream, the overflow has yearly increased in volume by wearing away its banks, until now, at low water, the old Saskatchewan channel carries but little water, and vessels of all kinds, even flat bottomed scows, follow the new channel. The great increase in the volume of water now flowing in what was Torch river has caused the stream to break through its banks in many places, and to carve out new channels through the low land, so that now the water follows many meandering courses, which reach Cumberland lake through mouths situated at various points along 12 miles of its southern shore. Even after reaching the lake the water keeps to a river-like channel, skirting

the northern shore and separated from the lake by long, narrow, wooded islands that form an almost continuous barrier, the gaps between them being few and narrow. The water rejoins the old channel of the Saskatchewan by the Bigstone and Tearing rivers, the two old outlets of Cumberland lake, now, however augmented by the increased volume of water into rivers with broader and deeper channels than formerly. The water of the Saskatchewan always carries a large amount of suspended, silty matter, and from the greater abrasion along the new channels, pours into Cumberland lake a still more murky flood. The sedimentation due to this, together with the wearing down of the outlet channels by the increased flow of water through them, has already made the lake so shallow as to be navigable, in low water, only through tortuous channels leading to the two outlets.

APPENDIX "C"

EXTRACTS FROM REPORT OF A. E. FORWARD ON THE SURVEY OF THE LOWER SASKATCHEWAN

Oct.-Nov. 1909.

APPENDIX "C"

EXTRACTS FROM REPORT OF A. E. FORWARD ON THE SURVEY OF THE LOWER SASKATCHEWAN

Oct.-Nov. 1909.

Description.

The Upper River. In spring the plains of Alberta give off a great volume of water which is later augmented by the water from the mountains. For hundreds of miles this flood passes between high clay banks and alluvial deposits, which results in a constant scouring process. In this part of the river the banks are often from 100 to 300 feet high. An immense amount of earthy matter is carried in suspension, besides a great deal of forest wreckage. The variation between high and low is very great. At Edmonton the river has risen 20 feet in a few hours.

Below the junction of the North and South branches of the Saskatchewan, the country gradually becomes lower. The Pas is over 400 feet lower than Prince Albert (actually 524.5 ft. L.R.V.). A long series of shallow rapids begins shortly below the forks, the last one being the Squaw Rapid, 125 miles down. Between these various rapids the river spreads out in broad stretches full of sandbars and islands. The bars are constantly shifting about.

Sipanock. Ten miles below the Squaw Rapid, on the south side, is the Sipanock or the underground river, as the name implies. This river, has time and again, been flooded out allowing the waters of the Saskatchewan to pass over into the Carrot River, and thence back to the main stream a few miles above the Pas. This new water course has opened up more each year; cutting out the soft banks until now quite a portion of the Saskatchewan water passes this way. In high water a good sized tug drawing four feet of water has been able to go all the way through by this route. By some, it is

thought that this may be the best method of navigating this part of the river, from the Pas to Squaw Rapids...........

....

Sturgeon Cut-Off. Four miles below the Sepenock or 139 miles below the Forks, the Saskatchewan has destroyed its north bank and gone over into the Sturgeon River, thence to Cumberland Lake. This leaves the old river bed practically dry for over 50 miles to the mouth of the Bigstone River, the first outlet of Cumberland Lake.

From the Cut-Off, the waters pass over into the Sturgeon River and spread over a large tract of country entering the lake in many channels, none of which are sure of having one foot of water in the low stages. The lake is acting as a settling basin and is filling very rapidly.

Cumberland Lake. At the outlet of Cumberland Lake, there are two channels, the one generally used being the Bigstone River. It has a very shallow and difficult rapid in low water. From this river to the mouth of the Tearing River the channel is rather shallow. Below that there is good water all the way to the Pas.

From the Squaw Rapids, the river flows the entire distance to Cedar Lake (225 miles) through a great flat region of lake and marsh. The banks rise nowhere to any considerable height above the water. In most places one walks away from the river not more than a hundred yards before encountering a lake or a marsh. The banks are covered with trees in most places. The flood waters come down and go out over the banks into a great tract, becoming lost probably 40 or 50 miles from the river. In early summer these basins are filling. Later in the year the flow is back into the main stream. The two-fold function of this area is (1) to act as a vast storage basin equalizing

the flow of the lower river and (2) as a settling basin. Much of the earth in suspension is deposited here. Lakes which 15 years ago had six feet or more of water in the fall were observed this fall to have less than two feet. The shores are strewn with trees and branches brought down by the river and great flat mud shores are exposed to view. The effect is extremely dismal and lonely ....

This whole tract is a prairie in course of construction. Should it be blocked below and allowed to fill for a number of years, until a level 10 or 15 feet higher was reached, then let the water away by the removal of the dam, a great tract of land would soon be in condition for settlement, whereas now the only value of the whole country is the muskrats and fish which it yields. Cedar Lake and Cross Lake are filling very noticeably. Perhaps this earth could be deposited to better advantage in raising the elevation of this central region.

Cedar Lake. Cedar Lake is about 42 miles in length from east to west, the main part of it being 15 or 20 miles wide. The shores and basin are all of rock with the exception of deposit from the Saskatchewan at the upper end. The mid lake is fairly deep but when approaching shore there are many rock reefs and the bays are generally very shallow. The islands are low, also the shores, about ten feet on the north side, the south side rising quite high farther back from the waters edge and are covered with spruce, poplar and poor scrub, all too small for timber.

Rabbit Point. About 28 miles from Chemahawin, Rabbit point stretches out from the north side probably three miles and a rock reef here runs all the way across the lake. On the first bar encountered in front of this point there proved to be not less than 8 feet of water. A little farther on is a bar with not more than five feet, and extending for fully half a mile towards the Narrows. With Cedar Lake at its

present level a channel would be necessary to pass safely over this reef with a boat drawing five feet. Once past Rabbit Point, the lake is like a great broad river of very sluggish flow. It is from five to seven miles wide and has many islands. From here to Lake Winnipeg the river flows on a rock bed and the banks are generally of rock, in place or of spalls broken free by the action of ice and frost. The 13½ miles to the Narrows is generally good water and a channel giving ten feet of water can probably be found.

Narrows. The only navigable channel for even four foot boats is to pass through the Narrows, a small channel between an island and the south shore, and only 100 feet wide at its entrance with five feet of water and flowing swiftly. Lower down it widens out to from 150 to 200 feet but it is shallow again at the foot of the island, the best water being five feet and mostly much less. This spot marks the present extreme lower end of navigation on the Saskatchewan, at least during a low stage of the water. The many islands in this part of the river are quite heavily wooded and though fairly low are quite picturesque.

Flying Post. Passing through the Narrows the channel turns sharply to the right, running east for half a mile, and for the most of that distance is only four feet deep, increasing to ten feet at the head of the Flying Post Rapid, where the river turns due south. In a distance of three quarters of a mile the fall is about four feet over a very shallow rocky bed and flowing very swiftly. There is only a narrow channel in which any water flows at present, 3½ feet being the best water in the main fall of the rapid. Outside of that channel rock reefs are sticking out everywhere, much of the river bed having one foot and less of water. The right shore and the island are fairly high, about eight to ten feet out of water, the left bank on the other hand being very low and flooded for a long distance during the high water

months. Below the rapid is a great lake like expanse a mile and a half wide with nine and ten feet of water.

Anchor Point. Three miles from the Flying Post is Anchor Point, on the right hand side. The rock rises nearly 20 feet from the water, vertically and is 35 feet high a short distance back. On the left hand side a similar rock ridge is observed, extending away to the northward. One mile above the point there is seven feet of water which gradually shoals up to four feet at Anchor Point, the fall being about two feet in that distance. This is the first place where the waters of Cedar Lake can be held back by a dam. After passing Anchor Point the river is from eight to ten feet deep for upwards of half a mile, and about 1500 feet wide, then turning sharply to the east falls over a rock ridge into Cross Lake half a mile away.

Demie Charge Rapid. The fall in this rapid is approximately 7 feet evenly distributed. At the head of the rapid is six feet of water in the deepest channel, which is narrow, and shoaling up to five and four feet about the centre of the rapid. From bank to bank is about 900 feet. The land in the immediate vicinity of the rapid is low, only from two to seven feet above the water. Everywhere is dense woods, the heaviest yet observed, principally spruce, jackpine and poplar.

Cross Lake. Cross Lake is a fine sheet of water about six miles across from the Demie Charge to the entrance of the River on the east side. The shores and islands are densely wooded and rock is in sight almost everywhere along the shore. The average depth was found to be 25 to 28 feet with no shoals, the deep water extending right into the mouth of the river. The lake extends north about sixteen miles and is generally of good depth. By far the largest expanse in its length is the south end. In the north part of the lake there are some quite

narrow points. This has been a good place for fishing both whitefish and sturgeon.

Cross Lake Rapid. Leaving Cross Lake the river is deep and very broad for upwards of half a mile. Then a barrier ridge of limestone crosses the bed forming a shallow rapid a half mile in length, and having a fall of seven feet. The stream is divided into three channels by two islands, only the south channel being of any considerable width, and all three are very shallow, averaging less than four feet and only two feet on the ledges. Both islands are low and not more than five feet above the water in the highest places. They are covered by scrub and hay land, all bearing evidences of being overflowed at high water. The main banks are about seven or eight feet high, gradually rising from the river to probably fifteen feet in a thousand feet or more.

Inland Channel. At the foot of the rapid a big inlet about 1000 feet wide and known as the Inland Channel extends to the southward, three or four miles, leading through a creek to a lake. Indians testify that it is not difficult to go to Lake Winnipeg around that way in high water, by following a chain of lakes and small creeks.

Capstan Point. The main river turns sharply to the left and runs due north afterwards bending to the eastwards to Capstan Point a mile below the rapid. This stretch has from 15 to 20 feet of water and is over 1000 feet wide. On Capstan Point still stands the old capstan, used in bygone days in warping yorkboats and steamers up the Red Rock Rapid, which begins just below the Point.

Red Rock Rapid. The water shoals up to less than five feet and begins to run swiftly, course almost due east in this rapid. For the next mile the stream is wide (1200 feet) and very shallow, the surface of the water conforming to its rock bed, from two to five feet deep and full of boulders.

The total fall is from seven to eight feet. The shores vary from ten to fifteen feet in height and rock shows everywhere. About the middle of the rapid on the south side, the place rock stands up above the water about ten feet and still bears traces of the red moss which gave the rapid its name.

Below the Red Rock Rapid, the channel is seven and eight feet deep, increasing to 15 feet in less than a half mile. To the head of the Grand Rapids there is plenty of water with the exception of a few rock shoals which could be avoided by marking out a channel; the river is of good width, being from 600 to 900 feet. The banks are steadily increasing in height as one proceeds down river. While the Red Rock is rather a difficult piece of tracking for even canoes, the stretch of river below the Warehouse is not bad. There is a current of from two to four miles per hour. Half a mile above the rapid stands the H. B. Warehouse, from which point the tramway runs over the portage (3½ miles) to the village. The bank is over twenty feet high, rising rapidly to forty feet or more.

Grand Rapids. The pitch of the greatest rapid of the series is encountered in a big bend of the river where it is about 1300 feet wide. For a distance of four miles the fall (approximately 68 feet) is fairly evenly distributed. Owing to the great fall the banks are much higher for a distance below the middle of the rapid. After the first pitch, the first half of the rapid is fairly deep, eight to ten feet being a common depth, though not in any very wide channel. This stretch is far the roughest. In length of the small island, 1000 feet, the fall was found to be 6½ feet. Banks along this part are magnesium limestone of a light grayish yellow color, rising from the water in some places thirty feet high. This rock weathers hard, fractures in large pieces with almost rectangular faces, and will likely prove to be an excellent building stone. The vertical shores break off rather abruptly about the middle of the rapid, and

the rock changes entirely in character. It is overlaid by many feet of boulder clay of whitish appearance. The rock becomes very shaly, lies in badly broken beds and does not rise so high above the water. The clay banks rise to fully sixty feet above the water and stand a little flatter than 45 degrees. The stream bed is flat rock 1200 to 2000 feet wide and strewn with many boulders, many of which are above the surface of the water, which was found to be from one to five feet in depth. Near the foot of the rapid an old channel leaves the river on the left side, at about right angles to the direction of the stream. This old channel is about eight feet above water and is dry. In winter time the great quantities of frazil ice forms a jam in front of the village and the water gradually rises and backs up into this old channel. Sweeping back in about a half circle, the depression returns to the river a mile further down and is there much lower, the water in its lowest stages extending several hundred feet inland, forming a deep bay. The Old Hudson Bay Post was situated on the point below this bay and the village of Grand Rapids extends along both banks towards the lake. The river runs almost due north to Lake Winnipeg, a mile and a half farther on. Lake steamers can already come up to the Hudson Bay dock without difficulty.

The dirty muddy waters which mirrored so perfectly the banks and trees of the Big Bend below Le Pas have long since left their burden of earthy matter behind and come foaming down the Grand Rapids, clear and pure, having a slightly greenish tinge.

Physical Features. From Cedar Lake eastward, the whole country is of limestone rock, the river bed being in most places free of any gravel, clay or sand, on account of the swift water the most of the way to Lake Winnipeg. Cross Lake has undoubtedly been much deeper but is filling up by acting as a settling basin.

In the surrounding country, boulder, clay or gravel ridges cover the rock in varying thickness and extending generally from north to south. They are covered with small jackpine, spruce, poplar and white birch. The hollows are mostly muskegs covered with a tangle of tamarac and scrub. Water can be found in many of these places by digging a foot or so into the moss.

The ridge which forms the barrier between Cedar Lake and Winnipegosis sweeps around in a northerly direction and crosses the Saskatchewan just before it reaches Lake Winnipeg, forming the Grand Rapids. At High Portage the ridge is about three miles wide and rises eighty feet or more above the water. The character is about the same at Grand Rapids.

APPENDIX "D"

EXTRACTS FROM REPORT OF G. H. WHYTE ON FLOODS IN ALBERTA AND SASKATCHEWAN IN JUNE AND JULY 1915.

APPENDIX "D"

EXTRACTS FROM REPORT OF G. H. WHYTE ON FLOODS IN ALBERTA AND SASKATCHEWAN IN JUNE AND JULY 1915.#

Introduction. In 1915, the eastern slopes of the Rocky Mountains between the Crowsnest and Yellowhead Passes in Alberta and the adjoining prairie in that province and portions of its eastern neighbour, Saskatchewan, were subject to unusual precipitation which, during June, was exceptionally heavy, culminating about June 25th. This heavy precipitation caused the run-off for all streams in this area to be much above the average, and in June and July, caused floods on many of the streams.

High water on the streams of Alberta and Saskatchewan is usual at least once a year and is of two kinds, depending on the type of catchment area; the first kind, when the ice breaks up and the run-off of the winter snows of the prairies takes place, occurs usually in March; the second, caused by the run-off of the snows of the mountains, in June or July. It is only occasionally that either of these periods of high water reaches the magnitude of a flood. Every few years on some minor streams and at longer intervals on the main arteries, floods of some magnitude occur which, while they may be augmented by the run-off of snow water, are caused by exceptionally heavy rainfalls in a short period of time over an already well saturated ground surface.

General Causes of the Flood of June-July, 1915. The causes of the large run-off over a short period in June, 1915,

#For complete report see Appendix No. 4, Report of Hydrometric Surveys (stream measurements) for Calendar year 1915, Dept. of the Interior, of Canada.

can be classed under two general heads, namely:

(1) The heavy precipitation of that period.

(2) The conditions affecting the run-off

Each of these two heads requires some discussion and while somewhat different, are also closely connected. That is, unless conditions were favourable for a speedy run-off of much of the rainfall, no such flood could have occurred. From the meteorological records it is seen that there were unusual amounts of rain in both May and June, 1915, and the rains of June 24th to 27th were of exceptional density at some points, therefore, no further discussion of the first head is necessary.

Under the second head, "The conditions affecting run-off", there are several sub-heads, namely:

a. Topography.

b. Geological structure.

c. Evaporation.

d. Vegetation.

e. Ground water.

The first of these, (a) "Topography", has, of course, a marked effect in changing rainfall to run-off. Steep slopes, as found in the foothills, and gentle slopes run off more than lands, such as prairies, which often have very slight slopes.

The (b) "Geological structure" of an area no doubt has some part in determining its run-off, but authorities seem to differ as to its importance. The areas under consideration in this report are, as far as run-off is affected, fairly similar in their geological structure and therefore need not be extensively commented upon. The upper beds of the mountain regions are for the most part of limestone series, although others are of quartzite, which in most cases has little or no soil cover. The foothills, on the other hand, are principally of sandstone and shale series which in general has an abundant soil cover. Full details of the geology of this whole area may be found in many reports on the geological features of the Rocky Mountains, or of various areas published by the Geological Survey of Canada.

The (c) "Evaporation" over an area is one of the most important points to be considered in a study of the run-off of precipitation. It depends on a great many other factors and is here taken to include direct evaporation into the air and indirect evaporation or absorption by plant growth. The amount of water evaporated into the air of course depends on the temperature, velocity of winds and atmospheric pressure. Over the area covered by this report it is known that the temperature during both May and June of 1915 was below normal, and in June up to the date of the heavy rains there were few warm days. Therefore it is assumed that from the point of temperature the evaporation would be low. The velocity of winds over the area from the records at Calgary and Edmonton was little above 1914 and probably about normal. Atmospheric pressure at Banff, Calgary and Edmonton was above that of the four previous years, and the effects that this condition would produce would favour low evaporation. The humidity was also greater in 1915 than in the two previous years. The absorption by plant growth would apparently not be as great in June as usual, as it was stated at that time that crops were backward, owing to the cool weather and great amount of rain. If the conditions were such on the prairies, where the mean temperature was about five degrees above the foothills and mountain section and the precipitation from two to eight inches less, it can be assumed that they were at least similar in the foothills and mountains.

From the foregoing it can be readily seen that the evaporation for May and June can be assumed as being below the average for those months, thus allowing more than the usual amount of rainfall to become ground water and run-off.

The (d) "Vegetation" of an area has a marked effect on the run-off and evaporation. A cover of trees with their matted roots forms an effective pondage for quantities of ground water and retards the run-off to a noticeable extent. They also protect the surface of the ground from the direct rays of the sun, reducing to some slight extent direct evaporation from the soil.

The presence of vegetation also has the effect of increasing evaporation by absorption into plant life and by exposure to the air of large quantities of moisture contained in leaves, much of which is evaporated.

It is seen, therefore, that forests and their plant life adjuncts have a retarding rather than an accelerating effect in converting precipitation into run-off. The foothills and mountains of Alberta are not well covered with tree growth owing to the repeated fires in past years. Better protection from fires is aiding the gradual development of forest cover, and as this cover extends, the effects of heavy rains should not be felt as quickly nor as markedly.

A proportion of all precipitation finds its way into the ground and forms that little known or understood part of hydrography called (e) "Ground water". The earth's surface is penetrated to great depths by ground waters which are constantly in motion. Towards the surface these waters are affected in their motion by various conditions, such as changes in atmospheric pressure and temperature. In addition to the above, precipitation, which is the source of ground water, plays an important part in such motion. The motions of ground or sub-surface water, like surface waters, are vertical and horizontal, and the vertical motion is greatly affected by rainfall. The horizontal or sub-surface flow of ground water is a fairly constant factor, that is, the channels remain of a more or less constant size, and the only increase in flow is caused by increase of head. The upper soils of the earth are much more open than the lower and especially is this true where there is a good growth of plant life and these parts are subject to great changes in position of the ground water. When heavy rains take place the upper soils absorb great quantities of water which gradually filter through the lower strata. If the rains are continuous it can be seen that sooner or later the surface stratum absorbs all the water it possibly

can, and as the lower strata cannot carry away the rain as fast as it falls most of it will have to run off on the surface.

South Saskatchewan River.

Description. This stream is formed by the junction of the Oldman and Bow Rivers at a point known as the Grand Forks in Alberta. It flows in a northeasterly direction through the eastern part of Alberta and almost across Saskatchewan where it joins the North Saskatchewan River forming the Saskatchewan River proper.

The river is joined by the Sevenpersons River near Medicine Hat, the Red Deer River just after it crosses into Saskatchewan and farther down by Swiftcurrent Creek, the Red Deer being the only tributary with much of a flow.

The whole of the drainage area of this river is prairie and from it there was little run-off in June to augment the flood discharges of the Oldman, Bow and Red Deer Rivers. It is therefore not necessary in this report to go into the causes of the flood, precipitation or temperature in the main drainage area.

Former Floods. This stream has been subject to floods of some magnitude on a number of occasions in the past few years, practically every flood on the three main branches causing floods or high water on the main stream. At Saskatoon on June 17th, 1908, the river reached a stage of 26.9 feet or 6 feet higher than in 1915. It is assumed by the city of Saskatoon that the flood of 1908 was the highest known at that point. At Medicine Hat it is believed that the flood of 1902 was the highest although no definite data are available. In 1908 the stream rose to within sixteen inches of the 1902 record. The 1908 record was 2142.68 feet above sea level (Canadian Pacific Railway datum). In 1897 a very high flood also occurred.

Progress of the Flood. It is difficult to determine what stream caused the peak at the lower stations. For

instance, it is ~~hard to say~~ if the maximum at Medicine Hat was caused by the waters of the Bow or Oldman River except by comparison of discharges. From them it would seem that the peak flood was caused by the Bow River and that it took twenty-four hours for the crest to pass the 168 miles between Bassano and Medicine Hat, at a rate of 7 miles per hour. The crest of the flood from the Oldman River apparently reached Medicine Hat about 9 a.m. June 28th, or at a rate of approximately 7 miles per hour. From Medicine Hat to Saskatoon, a distance of 400 miles, there is a difference of 108 hours for crests which would allow the upper water to travel at a rate of about 4 miles an hour. The crest from Medicine Hat, however, apparently reached Saskatoon 18 hours earlier or at a rate of 4.44 miles per hour followed by the crest from the Red Deer River. It took 131 hours for the Red Deer crest to travel 600 miles or at a rate of 4.6 miles per hour. Hourly gauge heights and discharges during the flood are given in Table B2 for Medicine Hat and B3 for Saskatoon.

Damage. There was little damage to property along this stream and there was no loss outside of some economic[#] losses at Medicine Hat and Saskatoon.

[#] The damage caused by floods may be divided into two classes - actual and economic. Under "actual damage" are classed direct physical losses that are tangible and apparent, a portion of which may be measured in terms of the expenditure required to restore the thing damaged to approximately its condition before the flood; the rest may be measured in terms of the monetary value of the thing lost or destroyed. Under the classification "economic damage" are placed those indirect losses that are, in a sense, presumptive. These include losses due to suspension of business and social relations in the flooded area and in places having such relations with that area; losses due to decreased confidence in the security of the localities flooded - especially the towns and cities, which may be termed lost prestige; losses due to general depression and decreased initiative throughout the flooded districts; and losses due to a materially decreased property valuation. For a former use of these terms see page 66 of the Water-Supply, Paper 334, the Ohio Valley Flood of March-April, 1913, published by the U. S. Geological Survey.

North Saskatchewan River.

Former Floods. From the conditions prevailing on the headwaters in the two upper sections it is seen that the North Saskatchewan River is liable to floods of a greater or less magnitude, and during practically each June or July the stage reaches a point which can be considered a flood period or borders closely on such condition.

Previous to 1915 the worst flood in the past fifty years, and in fact as far as records or memory goes, took place in August, 1899.

At that time the river reached a height equal to 41.37 feet on our gauges at Edmonton, or an elevation of 2034.75 feet, Public Works of Canada datum. This height gave a discharge of approximately 160,000 sec.-ft. from an estimate by Kutter's formula. At Prince Albert the gauge height reached was equal to 25.9 feet on the gaugé or an elevation of 1481.997 feet, Public Works of Canada datum. This height gives a discharge of 160,000 sec.-ft. by Kutter's formula.

Stories at Prince Albert and Edmonton give records of higher floods, but both seem to have been caused by ice jams in the spring. The jam at Prince Albert is alleged to have taken place some 35 or 40 years ago, while that at Edmonton took place over 60 years ago.

In 1900 the river reached a gauge height equal to 37.9 feet on the gauge at Edmonton and did considerable damage. Since August, 1907, we have fairly continuous records, and the highest gauge height reached was 26 feet on July 10th, 1912, the discharge on this date being about 75,000 sec.-ft.

During the floods of 1899 and 1900 considerable damage was done all along the river, but no actual figures are available. In 1899, the low-level bridge at Edmonton was in process of construction at the time of the flood and it was found necessary to raise the piers eight feet higher than at first proposed so as to provide for floods of such magnitude. The water reached to within one and one-half feet

of the tops of the present piers at that time.

The cause of the flood of 1899 is rather hard to decide, but in the writer's opinion it can be accounted for by the excessive rains rather than by the melting snows. The meteorological records at Edmonton for August, 1899, gave 6.43 inches of rainfall or 4.63 inches above the monthly mean. The mean temperature was 55.7° or 3.3° below the montly mean. It is very probable that these conditons prevailed to a greater degree in the two upper sections. It is usual to find that the snow has practically all melted by August and as rises had taken place in June and July of 1899 it is probable that this condition prevailed in that year. Therefore the assumption that this flood was caused by rains is borne out. During the whole summer the entire basin had a very heavy rainfall and in the two upper sections this rainfall would be stored to a certain point when it would run-off very rapidly and add much of the stored water to the exceptionally heavy rains of August.

Causes of Flood of June-July, 1915. The direct cause of this flood was no doubt the heavy rainfall between June 24th and 27th on the already thoroughly saturated drainage area. This rainfall was especially heavy on the upper sections of the basin and in the three days there were fifty-eight hours of continuous rain and the fall is estimated at approximately six inches by Mr. O. H. Hoover, of this staff, who was on the headwaters of the main stream at that time. This precipitation on a country which at best does not retain much of the rainfall and which had already been thoroughly satured by the heavy rains throughout the earlier part of the month caused sudden and excessive run-offs in a short period. The run-off from rain was added to by the rapid melting of the snows at this time.

Owing to the cloudy cold weather early in June the snows of the upper peaks did not melt as readily as ordinarily, and there was more than the usual amount of snow lying on the upper peaks on June 24th. Fortunately the snowfall during the

winter of 1914-15 was rather below the average.

An idea of the run-off of the upper section at this time can be gained by a study of the maximum discharge of some of the smaller streams in this locality. A very good example is the Mistaya River, a stream with a catchment area of some 130 square miles and on which there are six lakes which regulate the flow to a great extent. This stream reached a maximum discharge of 2,200 sec. ft., on June 27th, or 17 sec.ft. per square mile of drainage area. At Wilson's ranch on the North Saskatchewan River in Tp. 36, Rge. 16, W. 5th Mer., the maximum daily flow was 21,000 sec.-ft. with a catchment area of 836 square miles. This works out as a run-off of 25 sec.-ft. per square mile or 0.93 inches over the drainage area for one day. While these run-offs are by no means records they are high for the eastern slope of the Rocky Mountains in Alberta.

Precipitation and Temperature. Owing to the lack of settlement on the headwaters of the North Saskatchewan River, meteorological stations are not maintained and, therefore, no official records are available.

During June Mr. Hoover reported that there were eighteen days of rain and that during the whole of the early part of the month the temperature was low and the weather cloudy.

At Mountain Park (on the headwaters of the Macleod River at an elevation of 3,691 feet above sea level) the records for June show the mean temperature at 45.2 and the total precipitation as 12.26 inches with a maximum of 3.35 inches on a single day. There were twenty-one days on which 0.01 inch or more fell and nine fair days. At Banff (on the Bow River at an elevation of 4,534 feet above sea level) the records for June show the mean temperature as 50.2 or 1.1 degrees below the mean of twenty years, and the total precipitation as 6.05 inches or 2.86 inches above the average with a maximum fall of 1.97 inches on a single day. There were twenty days with 0.01 inch of rain or more, and ten fair

days. As the mountains on the headwaters of the North Saskatchewan drainage lie midway between these two stations it may be assumed that a mean of their records could be assumed as an average for this part of the basin. The mean temperature thus obtained is 47.7° and the total precipitation 9.16 inches. Using in addition the records obtained at Red Deer (which is to the southeast of the headwaters of the North Saskatchewan) and those at Edmonton (on the northeast of the headwaters of the North Saskatchewan) we find that the mean temperature was 50.3 degrees and the mean total precipitation was 7.14 inches. As the catchment area of the headwaters of the North Saskatchewan River lies within the trapezoid bounded at the corners by Banff, Mountain Park, Edmonton and Red Deer, the records for these points should give a very fair average for the whole area.

Progress of the Flood. The most westerly streams rising in and draining the main range of the Rocky Mountains started to rise during the night of June 24-25 and reached their maximum about noon June 27th. Those streams draining large areas east of the main range started to rise during the day on June 25th and reached their maximum about 10 a.m., June 27th, or about the same time. This allowed the drainage of the lower altitudes to pass off before that of the higher reached the main stream.

The crest of the main stream reached Rocky Mountain House about 2 a.m., June 27th, with a stage of 23.35 feet and an estimated discharge of 145,000 sec.-ft. At Rocky Rapids the crest arrived about 10 p.m., June 27th, and Edmonton about 11 p.m. June 28th, with a stage of 45.04 feet or 3.75 feet above any previous known stage and with an estimated flow of 204,500 sec.-ft. Battleford was reached about 5 p.m., June 30th, Ceepee about 6 p.m., July 1st, and Prince Albert at 1 p.m., July 2nd, with a stage of 26.42 feet, or 6.5 feet above the previous highest record, that of 1899, and a maximum discharge of 200,000 sec.-ft.

The rate of progress of the flood seems to have varied very greatly. From Wilson's ranch in Tp. 36, Rge. 18, W. 5th Mer., to Saunders' siding in Tp. 40, Rge. 1[illegible], W. 5th Mer., a distance of fifty miles and an approximate fall in elevation of 1[illegible].4 feet a mile, it took some six hours, or at a rate of 8.33 miles per hour, from Saunders' siding to Rocky Mountain House, a distance of forty-five miles, with a fall of 12.5 feet per mile, it arrived some twenty-one hours earlier. This was no doubt due to the flood on Sheep and Clearwater Rivers arriving before that on the main stream. From Rocky Mountain House to Rocky Rapids, a distance of 80 miles with a mean fall of approximately 5.5 feet per mile, the crest took twenty hours, or at a rate of flow of four miles per hour; from Rocky Rapids to Edmonton, a distance of 102 miles, and a fall of 6.6 feet per mile, it took twenty-five hours, or a rate of flow of 4.1 miles per hour; Edmonton to Battleford, 320 miles, with a fall of 1.6 feet per mile, forty-two hours, or a rate of flow of 7.6 miles per hour; from Battleford to Ceepee, sixty miles, with a fall of 0.9 feet per mile, twenty-five hours, or a rate of flow of 2.4 miles per hour; from Ceepee to Prince Albert, 98 miles, with a fall of 0.9 foot per mile, nineteen hours, or a rate of 5.2 miles per hour; from Battleford to Prince Albert, a distance of 158 miles, forty-four hours or at a rate of 3.6 miles per hour; from Edmonton to Prince Albert it took eighty-six hours to travel the 478 miles, or at a rate of 5.56 miles per hour.

<u>Damages.</u> The total damages caused by the flood are hard to accurately arrive at owing to the impossibility of making an accurate and exhaustive survey of such damages.

Above the mouth of the Clearwater River the only damages were to trails and to the grade of the Canadian Northern Railway (Brazeau branch). These losses would total to at least $30,000, principally to the railway whose grade was destroyed in a number of places. On the Clearwater River a new traffic bridge, about two miles from the mouth, was completely destroyed

with a loss of $2,500. At Rocky Mountain House the ferry was destroyed as well as the cable station of this branch. The cost of replacing the ferry was some $1,000 and the cable station some $150. The cable station at Rocky Rapids, owned by Sir John Jackson Company (Canada), was taken out, and it is estimated that it will cost at least $1,000 to replace it. The greatest amount of damage done was at Edmonton where the direct losses are estimated at from $500,000 to $750,000; the loss to the municipality being $17,500 caused by damages to sidewalks, roads and other property; the balance of losses being due to the inundating of the lower parts of the town known as Fraser, Ross and Mill Creek and Gallagher flats, the washing away of the Edmonton Lumber Company's Mill and the destruction of booms belonging to the Edmonton Lumber Company and the Walters' Mills. Many homes were destroyed and the damage to hundreds of others and their contents was very great. It is estimated that eight hundred families were rendered homeless by the flood. The loss of life was fortunately very light, the only casualty being an infant which was dropped by its mother from a floating side walk into the flooded street. The river began to flood over its banks at gauge height, 35.0 feet, at Edmonton and thus there was a depth of 10 feet of water at some points on the flats. The city electric light and pumping plants at Edmonton were out of commission for some hours owing to flooding of their boiler fires and this caused considerable inconvenience to numbers of business and residents in the higher parts of the city.

The damage to property along the river below Edmonton was not very great, a few farms along the flats were inundated and at Battleford several houses were flooded. At Prince Albert the principal damage was due to losses of logs which was well under $10,000.

At Edmonton the low level bridge was in danger owing to debris such as buildings, sidewalks, logs and roots collecting on the piers and bridge stringers, but this structure was saved

by clearing this debris away and by placing a loaded train on the bridge. The same procedure was carried out at Prince Albert where much debris collected on the piers. At Ceepee, the Canadian Northern Railway bridge approaches were damaged to some slight extent.

It is probable that the total actual damage on the whole stream amounted to between $750,000 and $1,000,000. In addition to the damage to property the stream channel at many points was completely changed. Banks and low flats were washed away and deposited at different points along the river and there is probably little of the river bed which was not changed to some extent. In general the river channel has been enlarged which will provide more room for such floods if they occur in the near future.

NORTH SASKATCHEWAN RIVER SURVEY

LIST OF BENCH MARKS FROM EDMONTON TO LAKE WINNIPEG

(DATUM: ASSUMED)

Table I.

NO. of B.M.	ELEVATION	REMARKS
0.	2042.530	On N.E.Corner of most N.E.Pedestal S.Shore of C.P.R. high level bridge, Edmonton.
1.	2025.000	On Left Bank on North Abutment Govt. Traffic Bridge, Edmonton.
1B.	2034.87	Top of N.E.Corner of W. Abutment of "East End" Bridge.
2.	2013.680	On Left Bank, to be repainted.
2A.	2019.870	" " " near Rat Creek 40' North of B.M.No.2, to be repainted.
3.	2008.975	" Right Bank on River Lot No. 43.
4.	1999.350	" Left " 300 yds. below Clover Bar Bdge. S.E.18-53-23.
4A.	2009.610	" " " 40' North of B.M.No.4: S.E.¼-18-53-23.
5.	2001.270	" Right " S.W.¼-29-53-23.
6.	1991.790	" Left " S.E.¼-34-53-23.
6A.	2001.240	" " " S.E.¼-34-53-23.
7.	1984.355	" " " S.W.¼-11-54-23.
8.	1975.865	" Right " S.W.¼-23-54-23.
9.	1976.380	" Left " on abutment of C.N.Ry.Bdge. above Fort Saskatchewan.
10.	1960.950	" " " East of Fort. Saskatchewan Settlement, N.W.14-55-22.
11.	1951.980	" " " N.W.¼-6-56-21.
12.	1945.257	" " " N.E.¼-27-56-21. To be repainted, elevation marked wrong.
13.	1927.840	" " " N.W.¼-9-57-20.
14.	1915.210	" " " S.W.¼-1-58-20.
15.	1903.335	" " " N.W.¼-30-58-19.
16.	1899.040	" " " S.E.¼-33-58-19.
17.	1885.945	" " " N.W.17-58-18. Lobstick settlement, to be repainted (Elevation marked wrong).
18.	1874.723	" " " N.W.¼-7-58-17.
19.	1858.175	" " " Victoria Settlement near Pakan Ferry.
19A.	1861.555	" " " Spike inside of tree 100' North of Ferry Landing.

NO. of B.M.	ELEVATION	REMARKS
20.	1851.175	On Left Bank S.E.¼-29-58-16.
21.	1854.300	" " " S.E.¼-34-58-16: Spruce stump.
22.	1831.530	" " " N.E.¼-30-58-15.
23.	1834.243	" " " S.W.¼-16-58-15.
24.	1843.487	" " " S.E.¼-4-58-15: Above Shandro.
25.	1832.327	" " " N.E.¼-30-57-14: Below " .
26.	1827.032	" " " S.E.¼-15-57-14.
27.	1821.220	" Right " at Desjarlais Ferry, S.E.11-57-1
28.	1820.542	" Left " S.E. -12-57-14.
29.	1819.112	" " " S.W. -16-57-13.
30.	1802.177	" " " I.R. No.125, above N.E.Fract. qr. of 14-57-13.
31.	1806.009	" " " I.R.No.125, 1 mile N.E. OF 12-57-13.
32.	1797.202	" " " N.E.33-56-12.
33.	1778.748	" " " N.E.¼-17-56-12: near L.N. Dispins House.
34.	1779.715	" " " S.W.¼-4-56-12.
35.	1777.655	" Right " S.W.¼-35-55-12: at Duvernay.
35A.	1768.520	" " " Spike in Tree.
36.	1778.965	" Left " S.W.¼-31-55-11.
37.	1776.205	" " " N.W.¼-35-55-11.
38.	1767.075	" " " S.W.¼-32-55-10.
39.	1761.820	" " " S.W.¼-22-55-10.
40.	1752.291	" " " Near middle of South Boundary of 24-55-10.
41.	1753.632	" " " S.W.21-55-9.
42.	1750.338	" " " N.W.¼-13-55-9.
43.	1746.035	" " " Near centre of 17-55-8: opposite Fort Isle.
44.	1747.480	" " " S.W.26-55-8.
45.	1739.310	" " " S.W. 8-56-7.
46.	1725.445	" " " At Hopkins Ferry N.W.15-56-7.
47.	1736.075	" " " N.E.¼-23-56-7.
48.	1731.300	" " " S.E.¼-19-56-6.
49.	1731.225	" " " N.W. -22-56-6.
50.	1704.015	" " " S.W.¼-19-56-5.
51.	1703.372	" " " N.R. -17-56-5.

APPENDIX "E"

TABLES

NO. of B.M.	ELEVATION	REMARKS			
52.	1692.948	On	Left	Bank	N.W.¼-23-56-5.
53.	1690.332	"	"	"	N.W.¼- 7-56-4.
54.	1680.840	"	"	"	S.W.¼- 4-56-4.
55.	1680.890	"	"	"	S.E.¼-22-55-4.
56.	1674.160	"	"	"	S.W.¼-18-55-3. 50 yds. below Sucker Creek.
57.	1663.990	"	"	"	S.W.¼-33-54-3.
58.	1666.010	"	"	"	N.W.¼-22-54-3.
59.	1661.632	"	Right	"	at Vermilion River S.E.14-54-3.
60.	1660.725	"	Left	"	S.E.¼-14-54-3: 300 yds. below mouth of Vermilion River.
~~61.~~	~~1675.195~~	~~"~~	~~"~~	~~"~~	~~N.W.¼-18-54-2.~~
62.	1698.350	"	"	"	S.W.¼-29-54-2.
63.	1663.015	"	"	"	S.E.33-54-2: Opposite Island.
64.	1659.343	"	"	"	N.W.¼-26-54-2.
65.	1676.773	"	"	"	S.E.¼-13-54-2.
66.	1683.525	"	"	"	S.E. -7-54-1.
67.	1708.240	"	"	"	S.W. 3-54-1. Large rock on side hill 600' from River.
68.	1704.815	"	"	"	4th Meridian large rock on side hill 600' from River.
69.	1775.010	"	"	"	S.E.¼-25-53-28, on large red granite rock on top of hill 1000' from River.
70.	1644.757	"	"	"	N.W.¼-16-53-27.
71.	1642.739	"	"	"	S.E.¼-11-53-27. 200' above Ferry Hewitt Landing.
71A.	1652.559	"	Right	"	Spike in tree.
72.	1643.356	"	Left	"	H.B.Reserve, Old Fort Pitt.
73.	1723.084	"	"	"	N.E.¼-21-53-26.
73A.	1644.092	"	"	"	N.E. -21-53-26.
74.	1639.529	"	"	"	S.W.¼-25-33-26: stump.
75.	1665.259	"	"	"	S.E.¼-20-53-25. Large rock 300' from River.
76.	1632.224	"	"	"	S.W.¼ -4-53-25.
77.	1626.034	"	"	"	N.W.¼-23-52-25. 1 mile above Little Red Deer River.
78.	1621.244	"	"	"	S.W.¼-18-52-24. 1½ miles below Little Red Deer River.
79.	1613.579	"	"	"	N.W.¼-25-51-25: ½ mile above Four Islands.
80.	1612.874	"	"	"	S.W.¼-20-51-24: 60' from River, 400 yds. above Creek, 1 mile above Lashburn Ferry.

NO. of B.M.	ELEVATION	REMARKS
81.	1612.094	On Left Bank N.W.¼-3-51-24: 150' from River opposite 3rd. Island.
82.	1603.559	" " " 2-51-24: 50' from River,
83.	1674.074	" " " S.W.¼-16-51-23: Not located in 1913. (¼ mile above White-Sand Creek).
84.	1618.039	" " " N.E.¼-11-51-23. 150' from River 2 miles below Whitesand Creek.
85.	1596.339	" " " S.E. ¼-1-51-23. 50' from River.
86.	1594.759	" Right " S.E. 24-50-23.
87.	1592.849	" Left " N.W.¼-15-50-22.
88.	1586.504	" " " S.E.¼-11-50-22.
89.	1584.484	" " " NE/SE.¼-30-49-21. Not located in 1913.
90.	1781.764	" " " approx. N.W. 9-49-21.
91.	1726.229	" " " 33/34-48-21. marked "90" and wrong elevation painted.
91A.	1577.619	" " " N.E. -33-48-21. Likewise 91A. marked 90A..
92.	1633.049	" " " N.W. -13-48-21. 500' from Ferry.
93.	1568.414	" " " S.W. -6-47-20. near Paynton
94.	1648.449	" " " 16-47-20. 1000' from River. Not located in 1913.
95.	1774.269	" " " 10-47-20. 1000' from River on large boulder on top of hill.
95A.	1560.251	" " " Stump N.W.10-47-20 Beside Creek.
96.	1777.194	" " " 1-47-20: 1000'
96A.	1560.192	" " " S.W.1-47-20 Stump.
97.	1732.409	" " " 28-46-19: 500 yds. from River ¼ mile below Bresaylor Ferry
97A.	1553.254	" " " close to Ferry road - Stump - S.W. 28-46-19.
98.	1551.848	" " " N.E.¼-23-46-19: 200' below foot of Island.
99.	1548.087	" " " S.E.¼-18-46-18: opposite small shack near top of hill.
100.	1722.682	" " " 17-46-18: 2 miles from River opposite Dalmas Ferry, not repainted 1913.
101.	1722.667	" " " I.R.No.115A. Thunderchild. 500 yds. from River, near old crossing.
101A.	1607.430	" " " Stump half way up first rise. S.E.3-46-18.
102.	1718.832	" " " I.R.No.115A. Very large rock 500 yds. from River (Marked 1718.732).
102A.	1548.790	" " " N.E.25-45-18. Stump just above small Island near North shore.
103.	1719.902	" " " N.E.¼-16-45-17: ½ mile from River below Jack Fish River.
103A.	1550.686	" " " Stump - N.W.16-45-17 below Jackfish River.
104.	1726.819	" " " 11-45-17. Big stone top of hill.

NO. of B.M.	ELEVATION	REMARKS
104A.	1537.268	On Left Bank N.E.11-45-17.
105.	1580.137	" " " N.E.26-44-17. 500 yds. from River 500 yds. below C.N.R.Bridge near track.
106.		Destroyed probably.
107.	1527.272	" " " N.W.¼-12-44-17: ¼ mile below head of Long Island North.
108.	1522.677	" " " Near N. Battleford Pump House (Marked 1522.777).
109.	1545.062	" Right " 300 yds. W. of Prince's Hill, South Battleford.
109A.	1522.627	" " " Spike in tree in front of Risdales House.
110.	1534.302	" Left " N.E.Abutment on Highway Bridge near North Battleford.
110A.	1548.09	" Right " Top of South Abutment of South Traffic Bridge, Battleford.
111.	1518.929	" Left " N.W.¼-22-43-16: 50' from River.
111A.	1524.354	" " " N.W.¼-22-43-16: 60' " "
112.	1517.394	" " " N.W.¼-12-43-16: 200 yds. above head of Island near this shore.
113.	1510.494	" " " N.W.¼-29-42-15: opposite L'Heureux House.
114.	1511.584	" " " N.E.¼-16-42-15.
115.	1529.644	" " " S.W.¼- 1-42-15.
116.	1502.614	" " " N.E.¼-32-41-14. 200 yds. above small Island and above Channel between large Island.
117.	1498.809	" " " S.E.¼-35-41-14: opposite end of long Island.
118.	1496.739	" " " S.E.¼-31-41-13: nearly opposite centre of Island which is 1 mile long near North Shore.
119.	1496.484	" " " S.W.¼-21-41-13: 100 yds. below Maymont Ferry.
120.	1490.769	" " " N.E.¼-11-41-13: 300 yds. above foot of Island.
121.	1495.284	" " " 200' above head of Island near Shore. S.W.¼-6-41-12.
122.	1485.514	" " " N.E.28-40-12.
123.	1507.189	" " " N.E.13-40-12. On top of cut bank 30' high and 100' back from water, ¼ mile below Sand Island, North.
124.	1480.544	" " " S.W. 8-40-11: about 1/3 way down from head of Long Island.
125.	1475.634	" " " N.E.¼-26-39-11: 200 yds. above Radisson Ferry.
126.	1498.644	" " " S.E.¼-19-39-10: near mouth of coulee.
127.	1468.724	" " " N.E. -15-39-10.
128.	1468.724	" " " N.E. -13-39-10: at old site of Borden Ferry.
129.	1460.584	" " " N.W.¼-14-39-9.

NO. of B.M.	ELEVATION		REMARKS.
130.	1475.494	On Left Bank	S.W.¼-24-39-9: nearly opposite big farm on other side of River.
131.	1458.804	" Right "	S.E.¼-30-39-8: copper plug with Hor. Line in S.E. end C.N.R.Bdge. on 1st. low pier.
131A.	1498.804	" Left "	N.E.¼-30-39-8: rock on knoll near North end of trestle C.N.R. Bridge (useless 1914).
132.	1489.413	" " "	S.W.¼-32-39-8.
133.	1464.177	" " "	N.E.¼-22-39-8: near trail.
134.	1469.180	" " "	S.W.¼-25-39-8: clump in burnt poplars ¼ mile from River opposite middle of longest Island.
135.	1459.350	" " "	S.W.¼ -5-40-7: close to corner of section and midway opposite Island North.
136.	1449.424	" " "	S.E.¼-21-40-7: near abandoned Ferry.
137.	1457.164	" " "	N.W. -11-41-7: near abandoned house foot of large Island.
138.	1450.974	" " "	S.E.¼-23-41-7: in bad order 1913.
138A.	1449.454	" " "	S.E.¼-23-41-7.
139.	1442.919	" " "	S.W.¼-36-41-7: on S.W. end of Island North of Section Corner.
140.	1437.944	" " "	N.W. -12-42-7: near head of very large Island.
141.	~~1440.969~~	" Right "	S.W.¼-19-42-6: ½ mile below Island and near head of small Island.
142.	1441.374	" " "	S.W.¼-32-42-6: ¼ mile below Petrofka Ferry.
143.	1437.619	" " "	N.W.¼- 4-43-6: near Heppner's rented house, 2½" poplar opposite middle of flat.
144.	1442.684	" " "	S.W.¼-10-43-6.
145.	1439.284	" Left "	N.E. -10-43-6: near German settler, foot of Island.
146.	1478.694	" " "	S.E.¼-26-43-6: in clump of small poplars on high side of hill.
147.	1434.316	" " "	S.W.¼-31-43-5: near Laird Ferry on road at foot of hill.
148.	1427.761	" " "	S.E.¼- 8-44-5: 50' from River, ¼ mile below Island North.
149.	1426.919	" " "	N.E.¼-15-44-5: ¼ mile below a big Island.
150.	1426.376	" " "	In River Lot No. 1 near foot of Long Island North.
151.	1425.189	" " "	S.W.¼- 7-45-4: on Creek.
152.	1433.029	" " "	S.E.- 7-45-4: at Carlton Ferry.
153.	1587.739	" " "	S.W.¼-26-45-4: on top of high bank 1/8 mile from River: ½ mile above long Island.
154.	1438.429	" " "	S.W.¼-36-45-4: on Hodgson's Rd. opposite end long Island.
155.	1418.394	" " "	S.W.¼- 7-46-3: close to Ferry, Tower, Silver Grove, Fingard.

NO. of B.M.	ELEVATION	REMARKS
156.	1416.914	On Left Bank S.W.¼-19-46-3: 8" twin poplar stump, ¼ mile above lower end of Big Island.
157.	1443.489	" " " N.W.¼-32-46-3: on a slope E. side of gully at Farmer John's.
157A.	1410.900	" " " N.W.¼-32-46-3: opposite Farmer John's.
158.	1436.810	" " " N.E.¼- 9-47-3: 3" poplar stump a little above cut banks.
159.	1416.541	" " " ¼ mile below wooded Island North 3" Birch stump N.E.-15-47-3.
160.	1412.756	" " " N.E.¼-23-47-3: opposite Cordwood Camp.
161.	1414.294	" " " N.W.¼-30-47-2: just below Northerly intersection of Range Line running N.&.S.
162.	1412.004	" " " S.E.¼-8-48-2: opposite head of small Island not correctly mapped.
163.	1407.816	" Right " N.W.¼-9-48-2: 9" spruce stump about ¼ mile below grassy Island.
164.	1406.350	" " " S.W.¼-27-48-2: 150 yds. below old log landing.
164A.	1544.644	" " " S.E.¼-27-48-2: on trail to Lily Plain from River, ¼ mile back from River.
165.	1498.989	" " " N.E.¼-31-48-1: opposite W.C. McKay's new house outside swamp.
166.	1409.179	" " " S.E.¼-5-49-1: at old Lily Plain Ferry 50' from bank, ½ mile below long Island N.
167.	1397.874	" " " N.W.¼-3-49-1: 250 yds. below old lime kiln and opposite middle of large wooded Island.
168.	1397.710	" " " N.E.¼-2-49-1: near Blakney's house.
169.	1451.977	" " " N.W.¼-25-48-1: on trail 250 yds. from Bank, ¼ mile below head of Gunn's Island.
169A.	1408.754	"" " " N.W.¼-25-48-1.
170.	1403.893	" " " N.E./N.W.24-48-1: ¼ mile above mouth of Miner's Creek.
171.	1402.904	" " " ¼ mile below Lily Plain P.O. and ½ mile above Willow Island, 8" spruce stump.
171A.	1500.819	" " " 6" poplar stump top of Bank.
172.	1390.123	" Alder opposite lower end of Badger Island near Browns.
173.	1462.612	" Right Bank on South side of road, ¼ mile below its near approach to river.
173A.	1393.885	" " " 50 yds. below road down from B.M.173.
174.	1389.867	" " " 4 miles West of Prince Albert, ½ mile below Shell River.
175.	1383.054	" " " At end of Street opposite new Penitentiary.
176.	1398.006	" " " Copper plug in S. Abutment C.N.R. Bdge. at Prince Albert.
177.	1382.184	" " " At end of 8th Ave. E. Prince Albert on pile.
178.	1383.665	" " " Prince Albert Co's. Mill Yard near creek 300 yds. below P. A. Mill.

NO. of B.M.	ELEVATION	REMARKS.
179.	1382.404	On Right Bank S.W. -28-48-25.
180.	1390.044	" " " S.W.¼-33-48-25 at Delcarte's place.
181.	1375.003	" " " S.E.¼-36-48-25: 1 mile below Brick Yard opposite bank.
182.	1373.901	" " " S.E.¼-31-48-24: East of Creek.
183.	1392.089	" " " N.E.¼-34-48-24: near Lowden's place.
184.	1395.345	" " " Cen. 35-48-24.
185.	1367.975	" " " S.E.¼-36-48-24: near Range Line and Correcting Survey.
186.	1363.461	" " " S.E.¼-19-49-23: at Barrett's place.
187.	1359.815	" " " N.E.¼-21-49-23.
188.	1346.114	" " " S.E.¼-27-49-23: 1 mile above Rapid No. 1
189.	1336.404	" " " N.E.¼-26-49-23: Just below Big Stone Rapid No. 2
190.	1324.312	" " " N.E.¼-25-49-23: Foot of Demie-charge Rapid No.4, ¼ mile above Old Ferry.
191.	1322.859	" " " N.W.¼-29-49-22.
192.	1302.949	" " " S.W.¼-28-49-22: Near head of Rapid No. 10.
193.	1299.490	" Left " N.W.¼-21-49-22.
194.	1295.812	" " " NE/SE-28-49-22: Head of Rapid No. 11
195.	1288.955	" " " NW/NE-22-49-22: Head of Crooked Rapid No. 12.
196.	1275.941	" " " N.E. -23-49-22, 1½ miles above the Forks on East and West Sect. Line North Shore.
197.	1264.341	" Right " Spike in 12" spruce tree at Forks.
198.	1253.934	" Left " N.W.¼-20-49-21.
199.	1248.261	" " " N.W.¼-22-49-21: 35' from brow not painted.
200.	1239.985	" " " S.W.¼-15-49-21.
201.	1250.259	" " " N.E.¼-15-49-21.
202.	1220.036	" " " 13/12-49-21: near small creek.
203.	1220.301	" " " N.W.¼-36-48-21: 450 yds. above high bank.
204.	1215.932	" " " N.E.¼-30-48-20: ¼ mile above high cut bank.
205.	1204.621	" " " S.W.¼-20-48-20.
206.	1209.618	" " " Below 1st. trail on Indian Reserve.
207.	1192.079	" " " Opposite upper Fort a la Corne Landing.
208.	1193.622	" Right " Just West of H.B.Co's. Reserve at Lower Landing Fort a la Corne.
209.	1185.064	" Left " S.W.¼-36-48-20.
210.	1176.204	" " " N.E.¼-7-49-19: 150' below mouth of creek.

No. of B.M.	ELEVATION	REMARKS.
211.	1170.964	On Left Bank N.E.¼-9-49-19.
212.	1160.759	" " " N.E.¼-11-49-19.
213.	1152.489	" " " NE/NW-17-49-18.
214.	1142.474	" " " NW.¼-22-49-18.
215.	1160.159	" " " S.W.¼-19-49-17, on top of 45' cut bank a little below head of Island.
216.	1133.474	" " " NE/SE¼-30-49-17.
217.	1114.504	" " " S.W.¼-33-49-17.
218.	1117.469	" " " N.W.¼-1-49-17. ¼ mile below creeks on each side of River.
219.	1108.944	" " " N.W.¼-5-50-16.
220.	1096.164	" " " N.E.¼-11-50-16.
221.	1094.484	" " " S.E.¼-12-50-16.
222.	1082.574	" " " N.E.¼-8-50-15: Poplar stump near T.S.S.1 (Brittains).
223.	1088.749	" " " S.E.¼-16-50-15: Near T.S.S.No.11 (Brittains).
224.	1066.943	" " " N.E.¼-11-50-15. Poplar stump near head of Nipawin Rapids, 150' from River.
225.	1058.044	" " " N.W.¼-18-50-14. 200' from River, foot Nipawin Rapids.
226.	1046.879	" " " N.E.¼-30-50-14. Poplar stumps 100' from River.
227.	1044.434	" " " N.E.¼-31-50-14. Poplar stumps 150' from River.
228.	1032.354	" " " S.W.¼-9-51-14.
229.	1042.144	" " " N.W.¼-15-51-14: on edge of high cut bank.
230.	1033.089	" " " S.E.¼-34-51-14.
231.	1020.234	" " " S.W.¼-1-52-14: head of clearing 200' from River.
232.	1013.354	" " " N.E.¼-7-52-13. poplar stump 30' from River.
233.	1018.834	" " " NW/NE-9-52-13. top of high bank.
234.	1002.254	" " " S.W.¼-15-52-13. at end of clearing, 200' from River.
235.	1002.889	" " " N.E.¼-22-52-13. poplar stump 50' from River.
236.	1001.719	" " " N.E.¼-23-52-13. spruce stump 50' from River.
237.	992.284	" " " S.W.¼-31-52-13. large poplar stump 100' from River.
238.	990.059	" " " Behind Crescent Island. Spruce stump NE/NW-6-53-12.
239.	990.464	" " " S.W. -3-53-12. poplar stump behind Island opposite Birch Island.
240.	983.634	" " " N.E.¼-2-53-12. spruce stump on large Island becoming part of mainland.

NO. of B.M.	ELEVATION	REMARKS
241.	984.309	On Left Bank N.W.¼-11-53-12. Birch stump.
242.	983.724	" " " N.E.¼-22-53-12. Poplar stump close to edge of bank behind large island at bend.
243.	976.209	" " " 1-54-12. Behind long Island N. Shore.
244.	968.769	" " " S.E.¼ -9-54-11. ¼ mile above foot of Wooded Island North.
245.	970.159	" " " Poplar stump close to water. S.E.¼-2-54-11. opposite break in long Island bars.
246.	966.954	" " " N.W.¼-32-53-10. Destroyed.
246A.	967.27	" " " N.W. -32-53-10. In old camping place 100' from River opposite end large Island.
247.	964.044	" " " S.W.¼ -9-54-10. Opposite Hat Island.
248.	957.899	" " " N.W.¼-15-54-10. Poplar stump.
249.	955.939	" " " S.W.¼-26-54-10. " "
250.	931.517	" " " N.W.¼-30-54-9. Rock 213' above up river from T.S.S.51 (Brittain, ¼ mile below Lain pitch Squaw Rapid.
251.	909.642	" " " Large rock; cross cut in limestone 700' below T.S.S.103 (Brittain) below Island North (Not good B.M.) S.E. -2-55-9.
252.	920.732	" " " N.W. -5-55-8. Large limestone boulder near bend.
253.	920.777	" " " 1 mile below Sipanock Channel, S.E.15-55-8 may be destroyed.
253A.	914.940	" " ". Marked "N" - N.W.24-55-8. On popple ridge just above upper cut - off Channel - run from 254A.
254.	909.087	" " " 500' above cut off Right Bank S.W.¼-30-55-7, destroyed.
254A.	909.382	" " " 14" poplar stump 550' above cut off right bank, S.W.30-55-7.
255.	905.382	" Right " Birch stump, foot sand bar South, N.E.32-55-7.
256.	902.647	" Left " Poplar stump 800' from River foot of Sandbar below point North N.E. 4-56-7.
257.	900.457	" " " Poplar stump behind Goose Island 300 yds. down, S.E. 15-56-7.
258.	898.972	" Right " Poplar stump opposite middle of Big Nigger Bar, S.W.36-56-7.
259.	896.322	" " " Spruce stump near head of Isl. and 15th Base Line (N.W.32-56-6)
260.	893.587	" " " Poplar stump head of sand bar S. Shore N.W. -3-57-6.
261.	893.692	" " " Poplar stump ¼ mile below sharp point S.W. -17-57-5.
262.	892.547	" Left " Poplar stump ¼ mile above point of Bend N.E.16-57-5.
263.	889.922	" Right " Poplar stump ¼ mile below sand bars at point North, N.W.19-57-4
264.	888.547	" Left " Poplar stump ¼ mile above sand bar North S.E.17-57-4, top of cut bank.

NO. of B.M.	ELEVATION		REMARKS
265.	888.052	On Right Bank	3/8 mile above high willow portion of bar (S) N.E.16-57-4.
266.	887.392	" Left "	Poplar stump 3/8 mile above sharp point N. Shore (N.W.10-57-4).
267.	886.377	" " "	poplar stump just above high sand bar S.Shore, N.W.11-57-4.
268.	885.257	" Right "	At lower end of long sand bar, N.E.13-57-4.
269.	884.462	" Left "	Poplar stump 20' from edge of cut bank, ½ mile above point North Shore, N.W.16-57-3.
270.	883.087	" Right "	Poplar stump (stone on sand bar here) N.W.11-57-3.
271.	882.412	" Left "	Poplar stump east side of wagon road portage 3/8 mile below Big Stone River, S.W.18-57-2.
272.	881.732	" " "	West side of road, Main portage to Cumberland House, N.W.17-57-2
272A.			Destroyed.
272B.	873.73		Nail N.E.Side of Revillon's Warehouse (Cumberland) July 20, 1914.
273.	880.372	" " "	middle of right bend in River, N.E. -3-57-2.
274.	879.147	" " "	poplar stump 5/8 mile above small Island South, N.E.36-56-2.
275.	877.162	" " "	poplar stump 1 mile below small Island N.E.29-56-2.
276.	876.447	" " "	300' below 2nd. Meridian North Side.
277.	875.167	" " "	Poplar stump 500' up stream, on Sask. from 2nd. mouth of Tearing River, S.E. -35-56-31.
278.	875.927	" " "	Poplar stump opposite centre of Large Island, S.W. 32-56-30.
279.	875.182	" " "	POplar stump at head of long sand bar, ½ mile above small Island, S.W. 33-56-30.
280.	875.132	" " "	Poplar stump, middle of Right bend where tangent to 15th Base Line, S.E. 3-57-30. (T.S. does not agree here).
281.	874.477	" " "	Poplar stump at bottom of 2nd. sand bar below B.M.280 (N.W.36-56-30) at a little S.West of 15th Base Line where cuts another River Bend Right.
282.	872.867	" " "	250 yds. up river from sharp point S.E.31-56-29.
283.	873.232	" " "	¼ mile below Barrier River 8/9-57-29.
284.	872.017	" Right "	½ mile below Bend Right N.E. 15-57-29.
285.	871.582	" Left "	Poplar stump 1200' below point of large Island, ½ way between Cumberland and Le Pas (N.W. -19 -57-28).
286.	871.092	" " "	HEad of Big Sand Bar (S.W.29-57-28).
287.	870.177	" " "	¼ mile above sharp point North. S.W.10-58-28.

NO. of B.M.	ELEVATION	REMARKS			
288.	869.777	On Right	Bank		on long straight stretch, west arm big bend, N.E.15-58-28.
289.	868.567	"	"	"	In elbow at foot (E) of big bend, S.E.13-58-28.
290.	868.437	"	"	"	Poplar stump near middle of (12-58-28).
291.	868.052	"	"	"	Poplar stump middle of 6-58-27.
292.	867.417	"	"	"	Poplar stump head of bar S.E.31-57-27.
293.	866.872	"	"	"	Poplar stump opposite bar at Little Eddy (N.E.19-57-27).
294.	866.732	"	"	"	Poplar stump above Outlet to Lake, (17-57-27).
295.	866.172	"	"	"	Poplar stump 1.3/8 mile above Island S. (N.W.5-57-27).
296.	866.227	"	"	"	Poplar stump opposite head of Island near S.Shore, N.W.33-56-27.
297.	865.207	"	"	"	Poplar stump ¼ mile above outlet of Reeder Lake, 21/22-56-27.
298.	864.747	"	"	"	Poplar stump ¼ mile below outlet of Reeder Lake, N.E,15-56-27.
299.	863.837	"	"	"	¼ mile below point at Big Eddy, S.W.24-56-27.
300.	862.422	"	"	"	Willow stump ¼ mile below Island, S.E.18-56-26.
301.	866.894	"	"	"	Copper plug in foundation South Corner H.B.Co's. Warehouse, The Pas.
301A.	865.717	"	"	"	limestone boulder painted grey 125' up river from Ross Navigation Co's. Office, The Pas.
302.	866.687	"	"	"	copper plug in upper side of S.Abutment H.B.Rly.Bridge at The Pas.
303.	862.840	"	Left	"	N.W.¼-14-56-23: 3" poplar stump standard 50' back from river and opposite log house South Shore.
304.	861.885	"	"	"	S.W.¼-19-56-25: poplar stump standard 50' back-marked with wooden cross: ½ mile above Little River opening South.
305.	861.835	"	"	"	N.E.¼-20-56-25: stump standard 30' back marked with wooden cross.
306.	860.815	"	"	"	S.E.¼-28-56-25: stump standard 40' back marked with wooden cross—2 miles below Little Riv.
307.	860.630	"	"	"	S.E.¼-27-56-25: stump standard 50' back marked wooden cross-3½ miles below Little River.
308.	860.110	"	"	"	N.E.26-56-25: stump standard, marked wooden cross, most northerly part Big Bend.
309.	859.590	"	"	"	S.E. -25-56-25: stump standard 25' from shore, marked wooden cross ¼ mile below Willows, River running south.

NO. of B.M.	ELEVATION	REMARKS
310.	859.350	On Left Bank S.W.24-56-25: stump standard 50' back ¼ mile below Mud Point.
311.	859.610	" " " N.E.11-56-25: stump standard 50' back opposite end of marsh on S.W. Side.
312.	857.940	" " " N.E.2-56-25: stump standard 30' from shore marked wooded cross.
313.	858.430	" " " N.E.35-55-25: 12" stump 50' back marked with cross: ¼ mile above Island S.W.Side.
314.	858.740	" " " Near line 26/25-55-25: 12" stump 30' back marked with cross: ½ mile below Island, S.W.Shore.
315.	858.200	" " " Near West line 19-55-24: stump standard 30' back, 1 mile above Moose Lake River.
316.	857.915	" " " S.W.20-55-24: stump standard 20' back ¼ mile below Moose Lake River on Main Saskatchewan.
317.	856.210	" " " S.W.17-55-24: 12" stump standard 40' back marked with cross and 1000' below dry cross Channel.
318.	855.485	" " " S.W.8-55-24: 12" stump 30' from shore marked with cross ¾ mile above large Island.
319.	855.035	" " " N.E.36-54-25: just below correction line 16" stump standard, 50' from shore, ½ mile below head of Island, North Channel, marked with cross.
320.	855.005	" " " N.W.25-54-25: 12" poplar stump 30' from shore 500' above foot island.
321.	854.100	" " " S.W.25-54-25: 12" stump 40' back marked with cross, 1 mile below Island.
322.	853.620	" " " S.W.19-54-24: on 12" poplar stump standard 30' back marked with cross, nearly ½ mile below Lake opening.
323.	853.350	" " " near line (18/7)-54-24: 12" stump standard 20' back marked with cross.
324.	852.195	" " " N.W.6-54-24: 12" stump standard 50' back marked with cross, opposite lower Lake opening South.
325.	852.865	" " " near line (Tp.54/Tp.53): 6" willow 50' back, pointed, marked with cross, ¾ mile above creek N.
326.	852.760	" " " N.E.32-53-24: 6" willow stump pointed 30' back marked with cross, 800' above Creek N.
327.	852.300	" " " N.E.33-53-24: 6" willow stump squared pointed 20' inland marked with cross, ¼ mile below creek North.
328.	851.980	" " " S.W.34-53-24: 6" willow stump squared pointed 10' back marked with white cross.
329.	852.280	" " " S.E.34-53-24: 8" alder stump standard 25' back ¼ mile above side Channel South.

NO. of B.M.	ELEVATION	REMARKS
330.	851.665	ON Left Bank near line 35/36-53-24: 4' alder squared pointed marked with cross, N. Channel opposite head Hill Isl.
331.	851.235	" " " South Channel, S.W.31-53-23: 12" poplar standard marked with cross, ¼ mile above Big Lake River.
332.	850.035	" " " South Channel N.W.29-53-23: 14" poplar stump standard 80' back, on round point ¼ mile above small Channel.
333.	849.990	" Right " South Channel, N.W.28-53-23: 10" black poplar stump standard 20' back, ½ mile above small Island South.
334.	849.455	" " " S.E.¼-33-53-23: 6" willow stump squared pointed 20' back, 300' below point of Island South, marked cross.
335.	848.725	" " " Near middle of section 34-53-23: 12" black poplar standard, 15' back nearly ½ mile above Island.
336.	848.150	" " " Near line(35/26)-52-23: 14" poplar standard 40' back, 26 opposite foot of lower small Island.
337.	848.520	" " " S.E.26-53-23: 20" black poplar stump standard marked with cross, opposite lower end long Island bordering lake.
338.	848.395	" " " N.E.23-53-23: 14" white poplar stump standard (grey) marked with cross, ½ mile above long Island South.
339.	848.185	" " " South Channel N.E.14-53-23: grey willow squared pointed ¼ mile below head of Island South.
340.	847.225	" " " South Channel N.W.12-53-23: 12" white poplar stump standard 25' back, marked with cross, ¼ mile above foot of Island South.
341.	846.780	" Left " S.W.12-53-23: 9" white poplar standard, 25' back, 600' below lower point of long Island South, cross.
342.	847.115	" Right " S.E.2-53-23: 6" willow, squared pointed 15' below triangulation station 471.
343.	846.420	" " " S.W.35-52-23: 6" willow squared pointed 25' back marked with cross 200' below TSS.465.
344.	844.985	" " " N.E.36-52-23: stump standard 35' back close to small channel right, marked cross.
345.	844.825	" " " N.W.31-52-22: 10" crooked willow stump 20' back just above creek left.
346.	845.870	" " " N.W.29-52-22: 6" alder stump 50' back marked with white cross.
347.	845.680	" " " near line 20/21-52-22: above Pine Point 50' inland 6" willow squared pointed, opposite middle of small Island.
348.	845.175	" " " S.E.21-52-22: 6" alder squared pointed 20' back 1/8 mile above side Channel N.

NO. of B.M.	ELEVATION	REMARKS
349.	844.270	On Right Bank S.W.15-52-22: 6" willow stump squared pointed with cross, ¼ mile above Lake opening South.
350.	840.745	" " " S.E.¼-10-52-22: plug in ground painted white, nail in top, marked by board 500' above next B.M.
351.	844.310	" Left " S.W.11-52-22: 4" willow stump squared pointed marked with cross, ¼ mile above foot Island South.
352.	843.535	" " " S.E.¼-3-52-22: 6" willow stump squared pointed.30' back, 1000' below creek S.
353.	843.745	" " " N.W.¼-35-51-22: 6" willow stump squared pointed 50' back marked with cross, below 2nd. lake opening North.
354.	842.720	" " " N.E.27-51-22: 8" willow stump standard, near head of Island.
355.	843.190	" " " S.W.26-51-22: 6" willow stump squared pointed 75' back marked with cross, 1 mile above Big Island.
356.	843.250	" " " South Channel near head of upper large Island of two: 6" willow stump, 15' inland painted white top.
357.	841.880	" " " Main North Channel S.E.14-51-22: 12" willow stump standard 30' back, ¼ mile above lower end of Kettle Island.
358.	840.355	" " " S.E.12-51-22: nail top of plug painted white with stake to mark, also cross ¼ mile above side Channel North.
359.	842.585	" " " Just below small Channel North 35' back 7" willow stump painted white with cross to mark.
360.	842.250	" " " 4" willow stump,30' inland behind mud bank below lower end of grassy Island North near Tp. line(51).
361.	840.230	" " " S.E.36- (50)50-22: nail top of 3"x6" plug (white) 20' back, marked stake and cross, ¼ mile above Muddy Lake.
362.	839.935	" " " S.W.30-50-21: spike top 3"x6" fir plug (white) with cross and guard stake: ¼ mile below channel South to Muddy Lake.
363.	838.180	" " " S.W.29-50-21: plug painted white, 15' back with cross and guard stake: at Triang. Station 802, 1 mile above 1st Moose River.
364.	837.725	" " " N.E.29-50-21: nail top of plug 3"x6" painted grey with cross and guard stake 800' above 1st. Moose River.

NO. of B.M.	ELEVATION	REMARKS
365.	837.980	On Right Bank S.E.28-50-21: 3"x3" squared spruce plug painted white with cross and guard stake, 500' above low Island South.
365A.	835.770	" " " S.E.28-50-21: on blue granite boulder at point South.
366.	840.875	" " " 27-50-21: rock painted white marked with cross on shore, ½ mile above Right Channel.
367.	838.925	" " " S.W.26-50-21: 3" willow stump below foot of reedy Island, marked with cross.
368.	837.830	" " " S.W.23-50-21: 3" willow stump opposite bottom grassy sand bar, marked with cross.
369.	840.030	" " " N.E.14-50-21: 8" spruce stump on limestone knoll 100' inland and ¼ mile above mouth of Muddy Lake.
370.	836.475	" " " Near Line 14/13-50-21: point of large lime stone painted grey: with white cross to mark below mouth of Muddy Lake.
370A.	839.100	" " " near Chemahawin Landing: 100' from River 40' above warehouse, pointed stump, was Dunn's B.M.
371.	839.430	" " " N.W.18-50-20: on point of rock opposite Church Chemahawin.
372.	836.970	" " " S.W.18-50-20: across point ¼ mile from last, on rock 550' S.E. from high portage on Bay.
373.	836.165	" " " N.W.7-50-20: on granite boulder panted grey on South Side of tongue of high land in Cedar Lake, South Side.
374.	837.530	" " " N.E.1-50-21: poplar stump marked by white cross, S. Side of point ¼ mile around Do, Cedar Lake.
375.	834.725	" " " S.W.1-50-21: on large limestone rock W. Side of very large bay 100' left of 194-50, Cedar Lake South Shore.
376.	837.900	" " " N.E.36-49-21: 6" poplar stump squared South side of very large bay and S. of point of Rocks 10' right of 230-50.
377.	839.460	" " " S.W.31-49-20: squared spruce stump, 1¼ miles S.W. of Olson's Point, and 700' from W. Shore of Lake, at Station 291.
378.	838.945	" " " S.E.25-49-21: on rock? West shore of Lake S.W. of long stony point.
379.	837.420	" " " S.E.24-49-21: poplar stump 15' right of station 401-20 South shore Cedar Lake.
380.	839.905	" " " N.E.13-49-21: poplar stump squared, 15' right of 463-00 (1¼ mile West of point).
381.	836.720	" " " S.E.18-49-20: 6" poplar stump 1000' West of sharp rocky point

NO. of B.M.	ELEVATION	REMARKS
382.	838.805	On Right Bank S.E.7-49-20: rock? near station 597-07 ½ mile S.W. of lagoon.
383.	838.860	" " " N.E.31-48-20: 125' south of base line and 50' R. of Station 680, South Shore Cedar Lake, E.C. Topog. B.M. 126 on 13th Base Line (about 400' W. of B.M.383) our Datum 834.33.
384.	837.330	" " " S.E.32-48-20: 1 mile W. of point with long reef. Station 762-75.
385.	837.600	" " " S.W.27-48-20: rock? 40' right of Sta. 866-99 on point 1 mile S.E. of point with long reef.
386.	837.920	" " " N.W.22-48-20 rock? 25' right of line 924-77, 3/8 mile north of creek.
387.	838.410	" " " S.E.15-48-20: poplar stump 20' right of 1004-25: ½ mile West of small Island S. Cedar Lake.
388.	838.110	" " " S.W.13-48-20: 10" cedar stump 25' right of 1092-40: ¾ mile E. of small Island and 1½ mile West of long point in Lake.
389.	838.155	" " " S.E.18-48-19 on rock? ¼ mile back from end of long rocky point in Lake.
390.	837.550	" " " N.E.8-48-19: 12" stump (poplar) at 1292-15 near reef in bay and 1¼ mile S.E. from long rocky point.
391.	838.095	" " " N.E.9-48-19: poplar stump 50' right of 1066-40.
392.	838.700	" " " S.W.10-48-19: rock? in S.E. portion of bay South side Cedar Lake.
393.	837.415	" " " S.W.14-48-19: rock? on S.Side point ¼ mile E. of point with long reef (1506-42).
394.	837.090	" " " N.E.11-48-19: on 8' white poplar stump (1582) on south side of bay lying S.W. of very long reef in Lake.
395.	837.690	" " " Sec.12-48-19; poplar stump 20' R. of 1636-90 on E. Side point nearly due S. of very long reef in Lake.
396.	837.850	" " " N.W.7-48-18: 12" poplar stump 75' Right of 1727-75 on W. side of round point.
397.	838.655	" " " S.E.6-48-18: 10" poplar stump 150' right of 1812-50 West side of big bay.
398.	835.205	" " " S.E.5-48-18 on large granite boulder 10' right of 1902-50, ¾ mile S. of four sq. reef in Lak
399.	838.480	" " " S.E.33-47-18: 8" poplar stump 150' rt. of station 1995-80, ¾ mile S.E. of crooked point.
400.	837.020	" " " East side sec. 34-47-18: 8" poplar stump 20' Rt. 2088-90, ½ mile West of Big Island in S. Lake.

NO. of B.M.	ELEVATION	REMARKS
401.	836.020	On Right Bank Near line 26/25-47-18: large limestone rock 150' Rt. of 2164: ¼ mile S.E. of large Island.
402.	835.230	" " " S.W.30-47-17: on limestone, at 2294-30 half way between two long points S. Shore Cedar Lake.
403.	838.430	" " " Sec. 20-47-17: 8" poplar at station 2371 in end of long narrow Bay running S.E..
404.	837.335	" " " S.E.29-47-17: on ledge of solid rock 30' Rt. of 2417-75 and 1 mile E. of rocky point.
405.	837.480	" " " N.W.27-47-17: 10" poplar stump 15' Rt. of 2511-65 (tree blazed) between small Island and Creek South.
406.	837.860	" " " Sec. 34-47-17: 10" poplar stump 40' Rt. of 2592-50 (tree blazed) ½ mile S. of rocky reefs.
407.	837.115	" " " N.W.2-48-17: 8" poplar 15' Rt. of 2668-80, 1 mile E. of small Rocky Island between Collins Island and South Mainland.
408.	836.235	" " " N.W.1-48-17: large granite boulder 35' Left of Station 2751 (2 miles E. of Collins Isl)
409.	835.045	" " " N.W.7-48-16: ledge of rock, 45' Rt. 2817-40 (tree blazed) ½ mile S. of Small Island.
410.	839.330	" " " S.W.19-48-16: ledge of rock at 2889.22 (white birch blazed) ¾ mile E. small Island.
411.	835.135	" " " S.E.25-48-17: rock? 55' Rt. of 2990-50 point S. Shore opposite N. end Collins Island.
412.	834.870	" " " Lake N.E.30-48-16: on out-cropping limestone near 3069-43 with blazed tree, 2 miles S.E. of Smiths Island.
413.	837.615	" " " Lake: S.E.32-48-16: on poplar stump, 84' rt. of 3155-43 on S.E. side of small bay S. of Charles Island.
414.	838.015	" " " near line 32/33-48-16: 12" stump at 3215-90 on West side Napanee Bay.
415.	837.345	" " " Midlake: 6" poplar stump in S.E. end of Willow Island.
416.	840.206	" " " N.E.2-49-16: 8" poplar stump standard 20' Rt. of 65-35 where meadow meets bluff East side Napanee Bay.
417.	839.773	" " " Near line (11/2)-49-16: 7" poplar stump standard S.E. side small bay near Portage (Station 116).
418.	837.263	" " " Near line (10/3)-49-16: 7" poplar stump standard 100' left of triangulation hub 153-62 W. of small point East side of Napanee Bay.
419.	837.945	" " " N.W.10-49-16: 8" poplar stump standard, 75' E. of old squared post opposite lower end of Johnsons Island.

NO. of B.M.	ELEVATION	REMARKS
420.	841.630	On Right Bank S.E.15-49-16: 10" spruce stump standard, 25' left of 269-45 S. on rock bluff W. side of head of bay.
421.	851.063	" " " S.E.14-49-16: 9" spruce stump standard at 199-40 main - 3/8 mile W. of rock point on West side bay near Narrows.
422.	837.828	" " " N.E.13-49-16: 9" poplar stump standard 20' rt. of 289-60 Main and ¼ mile S.W. of small portage bay near Narrows.
423.	840.849	" " " N.W.19-49-15: 9" poplar stump standard on rocky point - foot of Narrows.
424.	839.451	" " " S.E.19-49-15: 9" poplar stump in rocky cove ¼ mile above Flying Post Rapid.
425.	835.386	" " " S.E.19-49-15: 9" poplar stump standard on point opposite head of small Island middle of Flying Post Rapid.
426.	834.176	" " " N.E.18-49-15: 8" poplar stump standard at E. end of portage below Flying Post (bare spot here).
427.	834.311	" " " N.W.7-49-15: 8" poplar stump standard a little S. of retreat of long rock cliff (460-25).
428.	832.735	" " " N.E.1-49-16: 8" poplar stump standard at 544.90: poplar bluff S.W. corner of Bay.
428A.	847.346	" " " 8" jackpine stump standard on base line in bluff East of marsh.
429.	842.826	" " " S.E.6-49-15: 7" spruce stump standard at 613-06 in small cove S. side of River.
430.	833.818	" " " S.W.5-49-15: 9" poplar stump standard at Station 642, midway from #429 to spruce point, being ½ mile West of point.
431.	839.668	" " " S.E.5-49-15: 9" spruce stump standard on spruce point west of centre Island.
432.	834.091	" " " 9" spruce stump standard at Portage above Base Line on Anchor Point.
433.	827.811	" " " 9" poplar stump standard on point above small Island (Marked 434 in error)
434.	827.851	" " " 9" poplar stump standard opposite lower end of Small Island (Marked 433 in error)
435.	826.437	" Left " S.W.33-48-15: 6" poplar stump standard 30' back from River near head of Demicharge Rapids.
436.	822.732	" " " 9" poplar stump standard near line 34/35-48-15, N.W. Cross Lake.

NO. of B.M.	ELEVATION	REMARKS
437.	824.164	On Left Bank S.W.32-48-14: 8" poplar stump standard near West end of Portage E. side Cross Lake.
437A.	823.789	" " " Water Power Survey B.M. S.W.Cor. of N.W.¼ Sec. 29-48-14: stump marked Elev. 822.26, on point at entrance to river from Cross Lake.
437B.	823.907	" " " W.P.S. B.M. N.W.Cor. Sec. 28-48-14: stump marked Elev. 822.59, on East side of Portage Bay near West end of 9 mile Portage.
437C.	820.054	" " " W.P.S. B.M. S.W.Cor. Sec. 28-48-14: stump marked Elev. 818.67, on point at foot of Cross Lake Rapids.
438.	820.652	" " " N.W.28-48-14: 8" poplar stump standard ¼ mile above head of Red Rock Rapids.
439.	821.669	" " " S.W.34-48-14: 7" spruce stump standard 3/8 mile above foot of Red Rock Rapids.
439A.	808.184	" " " W.P.S. B.M. S.W.¼ Sec. 34-48-14: stump marked Elev. 806.94, on river bank at foot of Red Rock Rapids.
439B.	846.864	" " " W.P.S. B.M. N.E.¼ Sec. 34-48-14: marked Elev. 845.62- ½ mile back from River.
440.	801.449	" " " S.W.35-48-14: 8" poplar stump standard 50' back from river, 3/8 mile above Creek South.
441.	799.929	" " " N.W.25-48-14: 8" spruce stump standard 100' back from river, 1 mile above Warehouse.
441A.	823.544	" " " W.P.S. B.M. N.W.¼ Sec. 30-48-13: marked Elev. 822.35, ½ mile back from River.
441B.	808.484	" " " W.P.S. B.M. H.B.Co. Reserve, stump marked Elev. 807.29 at west end of H.B.Tramway.
441C.	811.544	" " " W.P.S. B.M. S.E.¼ Sec. 30-48-13: stump marked Elev. 810.44 at Metering Section 200 yds. below West end of H.B.Tramway.
441D.	798.844	" Right " W.P.S. B.M. N.W.¼ Sec. 19-48-13: stump marked Elev. 797.74 at metering section 200 yds. below West end of H.B.Tramway.
442.	809.349	" Left " S.W.Cor. H.B.Reserve, head of Grand Rapids (1 mile below Warehouse) being 9" spruce stump standard, 50' back from river.
443.	811.764	" " " W.P.S. B.M. S.W.Cor. H.B.Reserve head of Grand Rapids, stump marked Elev. 810.63 (1 mile below Warehouse) near #442.
444.	808.16	" " " W.P.S. B.M. S.E.¼ Sec. 19-48-13: marked Elev. 807.03, on trail 300 yds. from river.

NO. of B.M.	ELEVATION		REMARKS
445.	820.29	On Left Bank	W.P.S. B.M. S.W.¼ Sec. 20-48-13: marked Elev. 819.16, 700 yds. from River.
446.	775.74	" " "	W.P.S. B.M. S.E.¼ Sec. 21-48-13: marked Elev. 774.61, ¼ mile from River.
447.	780.82	" " "	W.P.S. B.M. S.W.¼ Sec. 22-48-13: marked Elev. 779.69, 400' from river, ¼ mile above the foot of Grand Rapids.
448.	735.28	" " "	W.P.S. B.M. N.E.¼ Sec. 22-48-13: marked Elev. 734.15, 250' from river, 200' below small Island.
449.	737.46	" " "	W.P.S. B.M. H.B.Co. Reserve, marked Elev. 736.33, 200' from river at East End of H.B.Co. Tramway.
450.	749.31	" " "	W.P.S. B.M. Lot No.8 Grand Rapids Settlement, marked Elev. 748.18, on boulder near Church of England.
451.	718.37	" " "	W.P.S. B.M. Lot No.20 Grand Rapids Settlement, marked Elev. 717.24 granite rock on river bank, ¼ mile from Lake Winnipeg.
452.	767.20	" " "	W.P.S. B.M. N.E.¼ Sec. 21-48-13: marked Elev. 766.07 on boulder near H.B.Co. Tramway.
453.	844.64	" " "	W.P.S. B.M. Between Secs. 20 and 29-48-13: marked Elev. 843.51 on boulder near H.B.Co. Tramway.

LIST OF TEMPORARY BENCH MARKS ON TRIBUTARIES OF NORTH SASKATCHEWAN RIVER.

Table II.

DESCRIPTION.	ELEVATION.
Mouth of Baptiste River	2975.00
North Sask. River, Rocky Mountain House Zero of Gauge 3108.93	3126.93
North Sask. River Green's Dam Site at the Gap	204.92
Mouth of Nordegg River	2875.00
Big Horn River, 1 mile from Mouth B.M. on poplar tree, 4 trees together on N. E. Bank of River.	100.00
Clearwater River at mouth, Chaingauge - Zero	3105.07
North Sask. River, ½ mile above Siffleur River B.M. on spruce stump on East Bank of River.	100.00
Mire Creek, near mouth section, about 100 feet above trail, B.M. on poplar stump, W. Bank.	100.00
Brazeau River below Nordegg River, Cagnat's B.M.	2880.00
Brazeau River, above Nordegg River.	2877.00
Ram Creek, ½ mile from mouth, B.M. on East Bank.	100.00
Cline River (White Goat), B.M. on spruce tree on small Island on N. side of river, 3 small spruces together, Section 150 feet above B.M. and about ½ mile above the trail.	100.00
Siffleur River, ¾ mile from mouth, B.M. on spruce stump 400 feet above Siffleur Trail on W. Bank.	100.00
White Rabit, ½ mile from mouth, B.M. on poplar stump, South Bank of river about 100 yds. above the trail, North of Forestry Cabin.	100.00
Cline River, 1¾ mile from mouth	100.00
Brazeau at mouth -- B.M. on South bank of Section on poplar, Section abut 600 feet above old shack and ¾ mile from mouth.	2850.00
Glacier Creek - Irrigation Survey B.M. at Lake outlet left bank of River.	100.00

ELEVATIONS OF ALL B. M. ASSUMED.

NORTH SASKATCHEWAN RIVER SURVEY

Adjusted Levels of 1915.

Table III.

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
0	2042.530	2052.151	24	1842.527	1852.148
1	2025.013	2034.634	25	1831.299	1840.920
1A	2034.997	2044.618	26	1825.934	1835.555
2	2013.716	2023.337	27	1820.092	1829.713
2A	2019.906	2029.527	28	1819.401	1829.022
3	2009.029	2018.650	29	1817.914	1827.535
4	1999.426	2009.047	30	1800.932	1810.553
4A	2009.686	2019.307	31	1804.724	1814.345
5	2001.360	2010.981	32	1795.864	1805.485
6	1991.912	2001.533	33	1777.357	1786.978
6A	2001.362	2010.983	34	1778.275	1787.896
7	1984.505	1994.126	35	1776.166	1785.787
8	1976.039	1985.660	35A	1767.031	1776.652
9	1976.581	1986.202	36	1777.438	1787.059
10	1961.075	1970.696	37	1774.610	1784.231
11	1952.020	1961.641	38	1765.422	1775.043
12	1945.195	1954.816	39	1760.104	1769.725
13	1927.676	1937.297	40	1750.530	1760.151
14	1914.952	1924.573	41	1751.820	1761.441
15	1902.992	1912.613	42	1748.479	1758.100
16	1898.651	1908.272	43	1744.136	1753.757
17	1885.458	1895.079	44	1745.526	1755.147
18	1874.147	1883.768	45	1737.277	1746.898
19A	1860.877	1870.498	46	1723.374	1732.995
20	1850.429	1860.050	47	1733.972	1743.593
21	1853.507	1863.128	48	1729.151	1738.772
22	1830.678	1840.299	49	1729.027	1738.648
23	1833.336	1842.957	50	1701.757	1711.378

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
51	1701.082	1710.703	81	1609.078	1618.699
52	1690.610	1700.231	82	1600.542	1610.163
53	1687.945	1697.566	83	1671.055	1680.676
54	1678.404	1688.025	84	1615.019	1624.640
55	1678.392	1688.013	85	1593.318	1602.939
56	1671.616	1681.237	86	1591.737	1601.358
57	1661.380	1671.001	87	1589.826	1599.447
58	1663.366	1672.987	88	1583.480	1593.101
59	1658.977	1668.598	89	1581.458	1591.079
60	1658.043	1667.664	90	1778.736	1788.357
61	1672.483	1682.104	91	1723.201	1732.822
62	1695.608	1705.229	91A	1574.591	1584.212
63	1660.248	1669.869	92	1630.019	1639.640
64	1656.544	1666.165	93	1565.383	1575.004
65	1673.934	1683.555	94	1645.416	1655.037
66	1680.645	1690.266	95	1771.235	1780.856
67	1705.320	1714.941	95A	1557.217	1566.838
68	1701.854	1711.475	96	1774.159	1783.780
69	1772.009	1781.630	96A	1557.157	1566.778
70	1641.755	1651.376	97	1729.372	1738.993
71	1639.736	1649.357	97A	1550.217	1559.838
71A	1649.556	1659.177	98	1548.810	1558.431
72	1640.351	1649.972	99	1545.048	1554.669
73	1720.078	1729.699	100	1719.642	1729.263
73A	1641.086	1650.707	101	1719.626	1729.247
74	1636.522	1646.143	101A	1604.389	1614.010
75	1662.251	1671.872	102	1715.790	1725.411
76	1629.214	1638.835	102A	1545.748	1555.369
77	1623.023	1632.644	103	1716.858	1726.479
78	1618.232	1627.853	103A	1547.642	1557.263
79	1610.565	1620.186	104	1723.774	1733.395
80	1609.859	1619.480	104A	1534.223	1543.844

BENCH MARK	ELEVATION		BENCH MARK	ELEVATION	
	N.S.R.S. Datum	Mean Sea Level Datum		N.S.R.S. Datum	Mean Sea Level Datum
105	1577.091	1586.712	133	1460.854	1470.475
106	1593.400	1603.021	134	1465.838	1475.459
107	1524.121	1533.742	135	1455.985	1465.606
108	1519.480	1529.101	136	1446.026	1455.647
109	1541.832	1551.453	137	1453.728	1463.349
109A	1519.391	1529.012	138	1447.521	1457.142
110	1531.046	1540.667	138A	1446.001	1455.622
110A	1544.834	1554.455	139	1439.450	1449.071
111	1515.672	1525.293	140	1434.452	1444.073
111A	1521.097	1530.718	141	1437.464	1447.085
112	1514.135	1523.756	142	1437.850	1447.471
113	1507.233	1516.854	143	1434.076	1443.697
114	1508.321	1517.942	144	1439.131	1448.752
115	1526.379	1536.000	145	1435.725	1445.346
116	1499.347	1508.968	146	1475.112	1484.733
117	1495.540	1505.161	147	1430.719	1440.340
118	1493.469	1503.090	148	1424.142	1433.763
119	1493.213	1502.834	149	1423.276	1432.897
120	1487.496	1497.117	150	1422.708	1432.329
121	1492.010	1501.631	151	1421.502	1431.123
122	1482.238	1491.859	152	1429.326	1438.947
123	1503.911	1513.532	153	1584.011	1593.632
124	1477.265	1486.886	154	1434.684	1444.305
125	1472.353	1481.974	155	1414.633	1424.254
126	1495.361	1504.982	156	1413.136	1422.757
127	1465.634	1475.255	157	1439.688	1449.309
128	1465.438	1475.059	158	1432.990	1442.611
129	1457.295	1466.916	159	1412.704	1422.325
130	1472.204	1481.825	160	1408.911	1418.532
131	1455.512	1465.133	161	1410.432	1420.053
131A	1495.513	1505.134	162	1408.115	1417.736
132	1486.113	1495.734	163	1403.921	1413.542

	ELEVATION			ELEVATION	
BENCH MARK	N.S.R.S. Datum	Mean Sea Level Datum	BENCH MARK	N.S.R.S. Datum	Mean Sea Lev Datum
164	1402.432	1412.053	193	1294.679	1304.300
164A	1540.726	1550.347	194	1290.980	1300.601
165	1495.038	1504.659	195	1284.097	1293.718
166	1405.219	1414.840	196	1271.040	1280.661
167	1394.897	1404.518	197	1259.403	1269.024
168	1393.723	1403.344	198	1248.945	1258.566
169	1447.969	1457.590	199	1243.232	1252.853
169A	1404.746	1414.367	200	1234.917	1244.538
170	1399.877	1409.498	201	1245.153	1254.774
171	1398.871	1408.492	202	1214.896	1224.517
171A	1496.786	1506.407	203	1215.102	1224.723
172	1386.063	1395.684	204	1210.694	1220.315
173	1458.531	1468.152	205	1199.356	1208.977
174	1385.776	1395.397	206	1204.313	1213.934
175	1378.948	1388.569	207	1186.700	1196.321
176	1393.881	1403.502	208	1188.400	1198.021
177	1378.024	1387.645	209	1179.610	1189.231
178	1379.479	1389.100	210	1172.679	1182.300
179	1378.159	1387.780	211	1165.396	1175.017
180	1385.773	1395.394	212	1155.130	1164.751
181	1370.644	1380.265	213	1146.793	1156.414
182	1369.529	1379.150	214	1136.725	1146.346
183	1387.634	1397.255	215	1154.339	1163.960
184	1390.864	1400.485	216	1127.614	1137.235
185	1363.462	1373.083	217	1108.583	1118.204
186	1358.895	1368.516	218	1111.484	1121.105
187	1355.196	1364.817	219	1102.906	1112.527
188	1341.455	1351.076	220	1090.051	1099.672
189	1331.710	1341.331	221	1088.339	1097.960
190	1319.589	1329.210	222	1076.363	1085.984
191	1318.102	1327.723	223	1082.519	1092.140
192	1298.149	1307.770	224	1060.644	1070.265

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
225	1051.681	1061.302	254A	901.478	911.099
226	1040.469	1050.090	255	897.406	907.027
227	1038.002	1047.623	256	894.589	904.210
228	1025.877	1035.498	257	892.351	901.972
229	1035.625	1045.246	258	890.773	900.394
230	1026.503	1036.124	259	888.057	897.678
231	1013.611	1023.232	260	885.253	894.874
232	1006.672	1016.293	261	885.251	894.872
233	1012.105	1021.726	262	884.066	893.687
234	995.472	1005.093	263	881.324	890.945
235	996.064	1005.685	264	879.886	889.507
236	994.859	1004.480	265	879.351	888.972
237	985.347	994.968	266	878.638	888.259
238	983.096	992.717	267	877.583	887.204
239	983.448	993.069	268	876.402	886.023
240	976.562	986.183	269	875.543	885.164
241	977.216	986.837	270	874.093	883.714
242	976.580	986.201	271	873.368	882.989
243	969.004	978.625	272	872.664	882.285
244	961.492	971.113	272B	869.662	879.283
245	962.832	972.453	272C	874.142	883.763
246A	959.858	969.479	272D	866.882	876.503
247	956.595	966.216	273	871.235	880.856
248	950.410	960.031	274	869.938	879.559
248A	931.769	941.390	275	867.908	877.529
249	948.396	958.017	276	867.079	876.700
250	923.937	933.558	277	865.740	875.361
251	901.948	911.569	278	866.455	876.076
252	912.982	922.603	279	865.678	875.299
253	912.950	922.571	280	865.567	875.188
253A	907.065	916.686	281	864.883	874.504
254	901.183	910.804	282	863.228	872.849

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
283	863.526	873.147	313	847.757	857.378
284	862.247	871.868	314	848.067	857.688
285	861.754	871.375	315	847.527	857.148
286	861.206	870.827	316	847.242	856.863
287	860.206	869.827	317	845.537	855.158
288	859.758	869.379	318	844.812	854.433
289	858.441	868.062	319	844.362	853.983
290	858.266	867.887	320	844.332	853.953
291	857.833	867.454	321	843.427	853.048
292	857.145	866.766	322	842.947	852.568
293	856.560	866.181	323	842.677	852.298
294	856.378	865.999	324	841.522	851.143
295	855.757	865.378	325	842.192	851.813
296	855.782	865.403	326	842.087	851.708
297	854.709	864.330	327	841.627	851.248
298	854.228	863.849	328	841.307	850.928
299	853.257	862.878	329	841.607	851.228
300	851.805	861.426	330	840.992	850.613
301	856.232	865.853	331	840.562	850.183
301A	855.055	864.676	332	839.362	848.983
302	856.014	865.635	333	839.317	848.938
TSBN	870.985	880.606	334	838.782	848.403
303	852.167	861.788	335	838.052	847.673
304	851.212	860.833	336	837.477	847.098
305	851.162	860.783	337	837.847	847.468
306	850.142	859.763	338	837.722	847.343
307	849.957	859.578	339	837.512	847.133
308	849.437	859.058	340	836.552	846.173
309	848.917	858.538	341	836.107	845.728
310	848.677	858.298	342	836.442	846.063
311	848.937	858.558	343	835.747	845.368
312	847.267	856.888	344	834.312	843.933

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
345	834.152	843.773	375	824.052	833.673
346	835.197	844.818	376	827.227	836.848
347	835.007	844.628	377	828.787	838.408
348	834.502	844.123	378	828.272	837.893
349	833.597	843.218	379	826.747	836.368
350	830.072	839.693	380	829.232	838.853
351	833.637	843.258	381	826.047	835.668
352	832.862	842.483	382	828.132	837.753
353	833.072	842.693	383	828.187	837.808
354	832.047	841.668	384	826.657	836.278
355	832.517	842.138	385	826.927	836.548
356	832.577	842.198	386	827.247	836.868
357	831.207	840.828	387	827.737	837.358
358	829.682	839.303	388	827.437	837.058
359	831.912	841.533	389	827.482	837.103
360	831.577	841.198	390	826.877	836.498
361	829.557	839.178	391	827.422	837.043
362	829.262	838.883	392	828.027	837.648
363	827.507	837.128	393	826.742	836.363
364	827.052	836.673	394	826.417	836.038
365	827.307	836.928	395	827.017	836.638
365A	825.097	834.718	396	827.177	836.798
366	830.202	839.823	397	827.982	837.603
367	828.252	837.873	398	824.532	834.153
368	827.157	836.778	399	827.807	837.428
369	829.357	838.978	400	826.347	835.968
370	825.802	835.423	401	825.347	834.968
370A	828.427	838.048	402	824.557	834.178
371	828.757	838.378	403	827.757	837.378
372	826.297	835.918	404	826.662	836.283
373	825.492	835.113	405	826.807	836.428
374	826.857	836.478	406	827.187	836.808

BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum	BENCH MARK	ELEVATION N.S.R.S. Datum	ELEVATION Mean Sea Level Datum
407	826.442	836.063	435	815.764	825.385
408	825.562	835.183	436	812.059	821.680
409	824.372	833.993	437	813.491	823.112
410	828.657	838.278	437A	813.116	822.737
411	824.462	834.083	437B	813.234	822.855
412	824.197	833.818	437C	809.381	819.002
413	826.942	836.563	438	809.979	819.600
414	827.342	836.963	438A	810.614	820.235
415	826.672	836.293	439	810.996	820.617
416	829.533	839.154	439A	797.511	807.132
417	829.100	838.721	439B	836.191	845.812
418	826.590	836.211	440	790.776	800.397
419	827.272	836.893	441	789.256	798.877
420	830.957	840.578	441A	812.871	822.492
421	840.390	850.011	441B	797.811	807.432
422	827.155	836.776	441C	800.871	810.492
423	830.176	839.797	441D	788.171	797.792
424	828.778	838.399	442	798.676	808.297
425	825.713	835.334	443	801.091	810.712
426	823.503	833.124	444	797.487	807.108
427	823.638	833.259	445	809.617	819.238
428	822.062	831.683	446	765.067	774.688
428A	836.673	846.294	447	770.147	779.768
429	832.153	841.774	448	724.607	734.228
430	823.145	832.766	449	726.787	736.408
431	828.995	838.616	450	738.637	748.258
432	823.418	833.039	451	707.697	717.318
433	817.138	826.759	452	756.527	766.148
434	817.178	826.799	453	833.967	843.588

-NOTE:- N.S.R.S. Datum is 9.621 Ft. above Mean Sea Level Datum.

NORTH SASKATCHEWAN RIVER SURVEY.

LOW WATER PLANE FROM EDMONTON TO LAKE WINNIPEG.

Table IV.

N.S.R.S. Datum (Assumed)

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
0.	2042.530	0.	2002.4	Top N.E.Cor. of E.Pedestal, 1st. series South, of C.P.R.Bridge-Edm'ton
		¼	2002.0	Walter's (upper Mill) Edmonton S.
1.	2025.000	1.5/8	2000.0	Datum, Edmonton Traffic Bridge.
1B.	2034.870	3.3/8	1997.6	Under East End Bridge, Edmonton.
2A.	2019.870	4½	1994.5	Rat Creek.
		5¾	1993.2	
3.	2008.975	6.7/8	1991.9	F.L. No.43 Above Coal out crop.
		9¼	1989.7	G.T.P. Bridge at Clover Bar.
4A.	2009.610	9.5/8	1988.0	S.E. 18-53-23.
		10.	(1987.0)	
5.	2001.270	11¼	1985.3	S.W. 29-53-23.
		13¼	1980.2	½ mile above coal out crop N. Shore.
6A.	2001.240	15¼	1978.2	S.E. 34-53-23.
		17.3/8	1974.1	¼ mile above Stony Bar and Rapid.
7.	1984.355	18¾	1969.6	S.W. 11-54-23. ½ mile below Rapid.
		20¼	1965.4	
		21.	1963.6	Head of Pine Point Rapid.
		21½	1962.5	Foot " " " "
8.	1975.865	21¾	1962.1	S.W.23-54-23 Head of Gravel Beach Right Bank.
		22¼	1959.7	200 yds. above small Island.
		23.	1958.0	200 yds. below " "
		23.3/8	1957.2	
9.	1976.380	24.7/8	1955.7	C.N.R. Bridge Fort Saskatchewan.
		27.	(1950.8)	Head of Long Island, South Shore.
		27.7/8	(1948.8)	Foot " " " " "
10.	1960.950	29½	1944.9	End Fort Sask. Settlement (N.Shore).
		31¼	1942.2	Hub B.558-North Shore.
		31.5/8	1941.7	

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
		32.5/8	1941.2	
		33.	1941.0	Head of Small Rapid.
		33¾	1937.5	Foot of Stony Bar.
11.	1951.980	34½	1935.0	N.W.6-56-21: Foot of Small Rapid.
		36.5/8	1930.5	
		38.5/8	1927.2	¼ mile below end of gravel bar South Shore.
12.	1945.257	40.5/8	1922.9	N.E.27-56-21.
		42¼	1919.3	
		43¼	(1918.2)	Redwater River.
		44¼	1916.0	Foot of 2nd. Island. Head of Little Vermilion Rapid.
		44¾	(1914.0)	Foot of 3rd. Island. Foot of Little Vermilion Rapid.
13.	1927.840	46.3/8	1910.5	N.E.9-57-20: 200 yds. below Stony Point, South Shore.
		48.5/8	1905.0	½ mile below Stony Bar.
		50.1/8	1904.0	½ " " River Creek Ferry.
14.	1915.210	52.1/8	1900.6	S.W.1-58-20: ¼ mile above Jump Off Rapids.
		52.3/8	1900.0	Head of Jump Off Rapids.
		52.5/8	1898.6	Foot " " " "
		54½	1892.2	3/8 mile below end of large Island.
		55½	1890.1	Head of small Island. Little Sucker Rapids.
15.	1903.335	57.1/8	1884.3	N.W.30-58-19.
		58¾	1879.2	Foot of Little Sucker Papids (North Bend).
		59¼	1878.1	½ mile above Waskatenow Creek.
16.	1899.040	59¾	1877.1	S.W.33-58-19.
		62¼	1871.5	
		63¾	1868.9	200 yds. above Rock out crop and Creek N.
17.	1885.945	65.5/8	1864.6	R.L. No.4 Opposite Coal out crop South Shore.
		67½	1857.2	
		68½	1853.7	Swift water opposite Shoals North and South.
18.	1874.723	70¼	1849.8	100 yds. E. of Range Line 18/17.
		73.	1845.7	3/8 mile above bar S. Shore.
		74.3/8	1843.5	½ mile above coal out crop South Shore.
		75¼	1842.7	3/8 mile above R.L. No.9: Pakan.
19A.	1861.555	76¾	1841.0	50 yds. below Pakan Ferry.
		77½	1839.5	Head of Victoria Rapids.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
		78¾	1883.1	¼ mile above large gravel bar.
		79¼	1831.5	Foot of Victoria Rapids.
20.	1851.175	80¾	1828.3	S.E.29-58-16: Sandstone Point N.
		82¼	1823.9	¼ mile below Stony Beach South Side.
		83¼	1820.7	Head of White Mud Rapid.
21.	1854.300	83.3/8	1820.0	S.E.34-58-16.
		83½	1819.5	Foot of White Mud Rapid.
		84.1/8	1815.7	Foot of swift ½ mile above Island.
		86.1/8	1815.1	
22.	1831.530	87.1/8	1814.5	N.E.30-58-15.
		87.5/8	1814.2	At creek south shore.
		88¼	1813.5	¼ mile above Island.
		89.5/8	1811.6	200 yds. below Red Clay Creek.
23.	1834.243	90.3/8	1810.5	S.W.16-58-15.
24.	1843.487	93¼	1807.4	S.E. 4-58-15.
		94.	1806.6	100 ft. below Shandro Ferry.
		94.3/8	1806.2	
25.	1832.327	97.3/8	1803.6	N.E.30-57-14.
		99.1/8	1800.6	
26.	1827.032	101.3/8	1797.6	S.E.15-57-14.
27.	1821.220	103.1/8	1796.0	Dejarlais Ferry. S.E.11-57-14.
28.	1820.542	104.	1793.7	S.E.12-57-14: Head of Sand Bar, North.
		105.	1790.9	Head of Crooked Rapids.
		105¼	1787.8	Foot of Main pitch Crooked Rapids.
		105½	1786.7	Foot of Gravel Bar and Foot of Crooked Rapids.
29.	1819.112	107.3/8	1783.3	S.W.16-57-13.
		109.	1780.6	Head of small swift in bend.
		109¼	1779.6	Foot " " " " "
30.	1802.177	110.1/8	1779.1	I.R.No.125. Above N.E.fractional ¼ of 14-57-13.
		110.7/8	1777.9	Below Sandstone Out Crops.
31.	1806.009	112½	1772.7	I.R.No. 125.
		113.1/8	1771.8	Head small swift.
		113¼	1770.4	Foot small swift ½ mile above Saddle Creek.
		113½	1770.3	

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
		114¼	1766.8	
32.	1797.202	115.5/8	1765.1	N.E.33-56-12.
		117.	1761.9	Head small bar East Shore above Island.
		118.3/8	1756.6	1/8 mile below foot of Gold Island.
33.	1778.748	118.7/8	1756.5	N.E.17-56-12: In front of L. N. Despins' house.
		119½	1755.2	Head Second large Island.
		119.7/8	1754.8	Foot " " "
34.	1779.715	121.5/8	1752.0	S.W.4-56-12: ½ mile above gravel bar in Centre.
		123¾	1749.4	½ mile above Brosseau Ferry.
35.	1777.655	124½	1748.5	300 yds. below " "
36.	1778.965	126¾	1746.5	S.W.31-55-11: At Hub G.336.
		129¼	1743.9	At Hub G.457.
37.	1776.205	130¼	1742.2	N.W.35-55-11: ¼ mile below house on South Shore.
		133.	1740.7	400 yds. below gravel bar North Shore.
		133½	1740.3	Head of Eye Rapids.
		133¾	1739.3	
		133.7/8	1736.8	Foot of Eye Rapids.
38.	1767.075	134.1/8	1736.7	S.W.32-55-10.
		135.7/8	1734.9	
39.	1761.820	137.7/8	1732.9	S.W.22-55-10: 250 yds. above upper Creek, South Shore.
		138.7/8	1731.4	Creek south shore foot of swift.
40.	1752.291	140[illegible]	1729.2	S.W.24-55-10: 300 yds. above foot of island.
		141.	1727.2	
41.	1753.632	143½	1726.4	S.W.21-55-9: 200 yds. above creek North Shore.
42.	1750.338	146¼	1723.7	N.W.13-55-9: 3/8 mile below old Trails North.
43.	1746.035	148.5/8	1721.0	Cen.17-55-8: Middle of Fort Island N.
		150.	(1718.7)	
		150.3/8	1717.9	1 mile below Fort Island.
44.	1747.480	151.7/8	1716.3	S.W.26-55-8.
		154¼	1712.6	Township Line 56/55.
		154¾	1712.1	
45.	1739.310	156½	1711.0	S.W.8-56-7.
		158.	1709.7	
46.	1725.445	158¾	1708.6	N.W.15-56-7: Hopkins Ferry.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
47.	1736.075	160.5/8	1707.3	N.E.23-56-7: ¼ mile above Atimosewe Creek.
		162.	1705.7	5/8 mile below Atimosewe Creek.
		163.	1704.5	Head of Dog Rump Rapids.
		163¼	1702.8	Foot of 1st. Pitch.
48.	1731.300	163.3/8	1702.5	S.E.19-56-6: Head of 2nd. Pitch.
		163¾	1699.3	Foot of 2nd. Pitch, D.R. Rapids.
		164¼	1699.0	Head of Swift.
		164.7/8	1697.3	" " "
		165.3/8	(1694.8)	Foot of Dog Rump Rapids Series.
49.	1731.225	166¼	1691.0	N.W.22-56-6.
		166½	1690.5	Head of Wolf Pond Rapids.
		166¾	1687.7	Foot of 1st. Pitch.
		167¼	1686.6	Head of 2nd. Pitch.
		167.3/8	1684.1	1000 ft. above small Island.
		167½	1683.4	Foot of 2nd. Pitch. 200 yds. above small Island.
		167.7/8	(1682.2)	Foot of Wolf Pond Rapids.
50.	1704.015	169¼	1678.2	S.W.19-56-5.
		170.	1677.7	
		170¼	1676.7	Head of Swift.
		170.3/8	1675.4	Foot of Swift.
51.	1703.372	171.5/8	1673.5	N.E.17-56-5.
		172.5/8	1672.5	Hub I-603.
		173½	1669.6	Moose Rapid No. 1. (Head)
		173¾	1667.7	
		173.7/8	1667.5	Foot Moose Rapid No. 1.
52.	1692.948	174½	1666.8	600 yds. above Moose Creek. N.W.23-56-5.
		175.3/8	(1666.2)	
		177.1/8	1665.6	Head Moose Rapid No. 2.
53.	1690.332	177½	1663.0	N.W.7-56-4: Foot Moose Rapid No. 2, 1000 ft. down large Island.
		179.3/8	(1660.0)	Head of 2nd. large Island.
54.	1680.840	180¼	1658.8	S.W.4-56-4: 250 yds. below foot of 2nd. Island.
		182.	(1657.4)	Foot of large expanse.
55.	1680.890	183.7/8	1656.0	S.E.22-55-4: 200 yds. above Creek S.
		185¼	(1654.5)	Head of Island.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
56.	1674.160	186.5/8	1653.0	S.W.18-55-3: Frog Creek.
		187¼	(1651.8)	Head of Frog Rapids Series.
		190¼	(1646.6)	Foot " " " "
57.	1663.990	190½	1646.3	S.W.33-54-3: ¼ mile below red granite boulders North.
58.	1666.010	192⅛	1644.5	N.W.22-54-3: 1 mile above small Island.
59.	1661.632	194.5/8	1643.0	S.E.14-54-3: Vermilion River.
60.	1660.725	194.7/8		S.E.14-54-3: 300 yds. below Vermilion River.
61.	1675.195	196½	1642.5	N.W.18-54-2 Approx.
62.	1698.350	198.1/8	1642.0	S.W.29-54-2.
63.	1663.015	199.7/8	1641.7	S.E.33-54-2: Head of Island.
64.	1659.343	201.5/8	1639.0	N.W.26-54-2: ¼ mile above Island close to North Shore.
65.	1676.773	204.	(1636.7)	N.W.13-54-2 Approx. 1 mile below Island (Head of Bar).
(66).	(1683.525)	206.3/8	1634.3	300 yds. below B.M. 66.
67.	1708.240	208¼	1632.0	S.W.3-54-1: ¼ mile down along wide sand bar, North Shore.
		211.1/8	(1630.1)	
		213⅛	(1628.1)	200 yds. above big Island.
70.	1644.757	216.	1626.2	N.W.16-53-27: 250 yds. below Small Island near North Shore.
71.	1642.739	218.7/8	1623.6	S.E.11-53-27: 200 ft. above Hewitt's Ferry, 1912.
		220⅛	(1621.6)	Hub K-975. South Shore.
72.	1643.356	222.1/8	1619.7	H.B.Co. Reserve. Just above Old Fort Pitt.
73A.	1644.092	225.	1616.7	N.E.21-53-26: ¼ mile above Pipestone Creek.
74.	1639.529	227.3/8	1614.5	S.W.25-53-26: Off lower end of bar near South Shore.
75.	1665.259	230½	161[illegible].2	S.E.20-53-25: ½ mile below Sand Bar.
		232¼	(1609.1)	100 yds. below Hub [illegible]-595 (South Shore)
76.	1632.224	234.	1607.0	200 yds. above Tp. Line 53/52.
		235¾	(1605.8)	Hub L-775: ¼ mile below Stony Bar.
77.	1626.034	237.3/8	1604.5	N.W.23-52-25: Head of Long Sand Bar North Shore.
78.	1621.244	239¼	1601.7	S.W.18-52-24: Middle of Long Gravel Bar.
		241¼	(1599.6)	¼ mile above 2 Islands.
79.	1613.579	243¾	1597.5	N.W.25-51-25: ½ mile above Long Sand Bar.
80.	1612.874	246.3/8	1594.5	S.W.20-51-24: 1 mile above Lashburn Ferry.
81.	1612.094	250.	1590.7	N.W.3-51-24: Opposite foot of largest Island.
82.	1603.559	251¼	1589.5	N.W. 2-51-24.
83.	1674.074	255.3/8	(1585.1)	S.W.16-51-23: Approx. 1 mile above White Sand Creek.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
84.	1618.039	258½	1581.8	N.E.11-51-23: 2 miles below White Sand Creek.
85.	1596.339	260¼	1580.4	S.E. 1-51-23.
86.	1594.759	263½	1577.2	S.E.24-50-23.
		264.	1576.9	½ mile below B.M. 86.
87.	1592.849	267.1/8	1574.1	N.W.15-50-22: Head of small Island.
88.	1586.504	269¼	1571.8	S.E.11-50-22.
		271.1/8	1570.4	½ mile below Englishman River.
89.	1584.484	273.	1569.0	NE/SE-30-49-21 Approx.
		277.	(1563.2)	
91A.	1577.619	279.	1560.3	N.E.33-48-21 Approx. marked 90A.
92.	1633.049	282¾	1557.4	N.W.13-48-21: Approx.
93.	1568.414	286.1/8	1553.3	S.W. 6-48-20: near Paynton Ferry opposite foot of Island.
94.	1648.449	290.	?	21-47-20: Approx. beside gully.
95A.	1560.251	292.	1547.2	N.W.10-47-20: Beside Creek.
96A.	1560.192	295½	1544.3	S.W. 1-47-20 Approx.
97A.	1553.254	300.	1539.9	S.W.28-46-19: At Bresaylor Ferry North Shore.
98.	1551.848	302.3/8	1537.3	N.E.23-46-19: 200 yds. below foot of Island.
99.	1548.087	305.1/8	1534.4	S.E.18-46-18: Opposite small shack at top of hill, ½ mi. above Delmas Ferry.
100.	1722.682	?	?	17-46-18: Approx Delams Ferry, 2 miles back from River.
		306.7/8	1532.4	Head of Island opposite Turtle River.
101A.	1607.430	309.1/8	1529.8	I.R. No.115A. Thunderchild. Foot of Island, Centre.
102A.	1548.790	312.	1526.8	I.R. No.115A. 100 yds. above Island Near N. Shore.
103A.	1550.686	315½	1523.3	N.W.16-45-17: Below Jack Fish River.
104A.	1537.268	318.3/8	1521.2	S.E.11-45-17 Approx.
		320.7/8	1517.5	At C.N.R. Bridge West of North Battleford.
105.	1580.137	321.	1517.4	N.E.26-44-17: 300 yds. below C.N.R. Bridge West of North Battleford.
		322¾	1515.7	Head of long Island.
106.	1596.492	?		26/23-44-17, Approx. B.M. destroyed.
107.	1527.272	325.1/8	1513.2	N.W.12-44-17: 2000 ft. below head of Island.
108.	1522.677	326.7/8	1511.0	Near N. Battleford Pump House.
109.	1545.062	328.	?	B.M. 300 yds. above Prince's Mill.
109A.	1522.627	328¼	1509.8	Risdale's. South Battleford.
110.	1534.302	329.	1508.9	North Side River at Highway Bridge North.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
110A.	1548.090	329.	(1508.9)	South Side of River at Highway Bridge South.
111A.	1524.354	331.5/8	1506.3	N.W.22-43-16: Nearly opposite Battle River.
112.	1517.394	334¼	1503.0	N.W.12-43-16: 200 yds. above head of Island N.
113.	1510.494	339.1/8	1497.3	Opposite L'Heureux house N.W.29-42-15.
114.	1511.584	342¼	1495.0	N.E.16-42-15: just below trail.
115.	1529.644	345.7/8	1491.3	S.W. 1-42-15: Approx. opposite head of Island in Centre River.
116.	1502.614	348¾	1488.4	N.E.-32-41-14: Approx. 200 yds. below foot small Island, North.
117.	1498.809	352.	1485.5	S.E.35-41-14: opposite foot of Long Island.
118.	1496.739	353¼	1483.4	S.E.31-41-13: nearly opposite centre of mile Island North.
119.	1496.484	356¼	1481.0	S.W.21-41-13: 100 yds. below Maymont Ferry.
120.	1490.769	359.3/8	1478.1	N.E.11-41-13: Approx. 300 yds. above foot of Island North.
121.	1495.284	361.7/8	1475.9	S.W. 6-41-12. 200' above head of Island North.
122.	1485.514	365.	1472.7	N.E.28-40-12.
123.	1507.189	368½	1469.4	N.E.13-40-12: ¼ mile below sand Island, North.
124.	1480.544	370¾	1467.2	S.W.8-40-11 Approx Head of small Island North. Opposite large Isl.
125.	1475.634	375½	1462.4	N.E.26-39-11: 200 yds. above Radisson Ferry.
126.	1498.644	378.3/8	1459.7	S.E.19-39-10: mouth Coulee opposite Head Sand Bar in centre.
127.	1468.919	382½	1456.1	N.E.15-39-10: opposite head Sand Island in centre of River.
128.	1468.724	384½	1454.2	N.E.13-39-10: Old site of Borden Ferry.
129.	1460.584	389¼	1449.8	N.W.14-39-9: Opposite centre of Island.
130.	1475.494	391.	1448.7	S.W.24-39-9: opposite Big Farm (S.
131.	1458.804	393.1/8	1446.5	C.N.R. Bridge, Ceepee.
132.	1489.413	394.	1446.4	S.W.32-39-8.
		395½	1445.2	1½ miles below B.M. 132.
133.	1464.177	397.	1444.0	N.E.22-39-8 Approx. Near Trail.
		398.1/8	1443.0	1.1/8 miles below B.M. 133 at head of double Island.
134.	1469.180	399¼	1441.9	S.W.25-39-8 Approx.
		401¼	1439.8	¼ mile above Willow Island.
135.	1459.350	402.	1439.0	S.W. 5-40-7: middle of Island N.
		403¼	1437.8	¼ mile below longer Island.
136.	1449.424	406.	1435.8	S.E.21-40-7: Near abandoned Ferry Road.
137.	1457.164	410.5/8	1432.2	NW.11-41-7 Approx. Near abandoned house and Creek, North, at foot of Island.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
138A.	1449.454	412.3/8	1430.7	S.E.23-41-7 Approx. ¼ mile below Sand Bar N. and New Ferry.
139.	1442.919	414.3/8	1429.0	S.W.36-41-7: On head of Island.
140.	1437.944	417¼	1426.7	N.W.12-42-7: Head of Big Island.
141.	1440.969	418¼	1425.5	S.W.19-42-6: Head of Small Island
142.	1441.374	421.	1423.7	S.W.32-42-6: ¼ mile below Petrofka Ferry.
143.	1437.619	423¼	1421.8	N.W.4-43-6 Approx. Middle of Flat opposite Heppner's.
144.	1442.684	424.3/8	1421.2	N.W.3-43-6: Near Head of Island.
145.	1439.284	425¼	1420.7	N.E.10-43-6: Foot of same Island near Settler North.
146.	1478.694	427.7/8	1418.9?	S.E.26-43-6 Approx. Opposite clump small poplars high on slope. Head of Island.
147.	1434.316	429¼	1417.5	Laird Ferry. On road at foot of hill.
148.	1427.761	432¼	1415.7	S.E.8-44-5 Approx.
149.	1426.919	435¼	1413.8	S.E.22-44-5 Approx. ¼ mile below Big Island.
150.	1426.376	438¼	1411.8	River Lot 1 Foot of Long Island North.
151.	1425.189	440¼		S.W.7-45-4 Approx.
		441¼	1409.1	1 mile above Carlton Ferry and 1 mile below B.M. 151.
152.	1433.029	442¼	1408.7	S.E.17-45-4: Carlton Ferry.
153.	1587.739	445.5/8	1406.3	S.W.26-45-4 Approx. ¼ mile above Long Island.
154.	1438.429	447½	1405.0	S.W.36-45-4: Hodgson's place foot of Long Island.
155.	1418.394	449.3/8	1403.4	S.W.7-46-3 Approx. Wingard Ferry.
156.	1416.914	451¼	1401.9	S.W.19-46-3: Behind Long Island, ¼ mile from foot.
157A.	1410.900	454¼	1400.0	N.W.32-46-3 Approx. Gully, Farmer John's Place.
158.	1436.810	456.3/8	1398.0	N.W.9-47-3 Approx. Just above cut banks.
159.	1416.541	458¼	1396.3	N.E.15-47-3 Approx. ¼ mile below wooded Island, North.
160.	1412.756	459½	1395.6	Cen. 23-47-3: Opposite cordwood camp.
161.	1414.294	461.5/8	1394.5	Just below Northerly Inters. of Range Line 3/2.
		463.	1393.2	Approx. Mouth of small creek.
162.	1412.004	464¼	1392.0	S.E.8-48-2: Opposite head of small Island.
163.	1407.816	465½	1391.3	N.W.9-48-2: About ¼ mile below low grassy Island.
		468.1/8	1389.3	¼ mile above B.M. 164.
164.	1406.350	468.3/8	1389.0	S.W.27-48-2: 150 yds. below Old Log Landing.
165.	1498.989	472½	?	
166.	1409.179	473.3/8	1385.2	S.E.5-49-1: Old Lily Plain Ferry.
167.	1397.874	475.1/8	1383.7	N.W.3-49-1: 250 yds. below old lime kiln.
168.	1397.710	476¼	1382.5	N.E.2-49-1 Approx. Opposite Channel between Blakeney's Isles.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
169A.	1408.754	479.	1380.7	N.W.25-48-1: ¼ mile below head of Gunn Island.
170.	1403.893	479.7/8	1380.1	¼ mile above mouth of Miner's Creek. N.W.24-48-1.
171.	1402.904	481.7/8	1378.6	R.L.No.6. ¾ mile below Lily Plain Post Office and 1 mile East of 3rd. Meridian.
172.	1390.123	485.3/8	1376.0	R.L.No.30 Approx. Near Brown's: Foot of Badger Island.
173A.	1393.885	487.5/8	1374.4	R.L.No.40: Foot of Willow Island.
174.	1389.867	489.	1373.3	R.L.No.45: Road at Big Bend above P.A. and half mile below Shell Riv.
175.	1383.054	490¾	1372.2	R.L.No.58 Approx. Road down from New Penitentiary.
176.	1398.006	493.	1369.9	Prince Albert, Canadian Northern Railway Bridge.
177.	1382.184	494.5/8.	1368.1	Landing below old "Marquis".
		495.	1367.7	Head of Big Island.
178.	1383.665	495.7/8	1366.7	300 yds. below P. A. Mill.
		497.5/8	1365.0	Foot of Willow Islands.
179.	1382.404	498.5/8	1364.3	S.W.28-48-25: Head of de la Gorgendieres Islands.
180.	1390.044	500.	1363.4	S.W.33-48-25: Head of Sand Bar.
		501.	1362.5	½ mile above Coal Island.
		503.	1361.0	Opposite Deacons Brick Yard.
181.	1375.003	504.	1360.5	" foot of Island.
182.	1373.901	504.5/8	1359.7	S.E.31-48-24: About 100' E. of Dry Creek.
183.	1392.089	508½	1355.7	N.E.34-48-24: About 200 yds. below head of Boulder Island.
184.	1395.345	509¼	1354.1	S.E.35-48-24.
		510¼	1352.6	Head of 1st. small Rapid.
		511.	1350.9	Foot " " " "
185.	1367.975	511¼	1350.1	Fractional 14-49-24.
		512.	1348.7	Head of 2nd. small Rapid.
		512¼.	1345.9	Foot " " " "
186.	1363.461	513¾	1342.7	S.E.19-49-23: Barrett's place.
		515.	1339.7	100 yds. above Sucker Creek.
187.	1359.815	516.1/8	1336.8	N.E.21-49-23.
		517¼	1333.7	Head of 3rd. small Rapid.
		517¾	1330.2	Foot " " " "
188.	1346.114	518.1/8	1329.0	S.E.27-49-23.
		519.	1326.4	Head of Peace Rapid (La Colle Falls No.1).
		519.1/8	1324.9	Foot of Peace Rapid.
		519½	1324.6	Head of Big Stone Rapid (La Colle Falls No.2).

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
		519⅛	1320.9	Foot of Big Stone Rapid.
189.	1336.404	519¼	(1320.0)	N.E.26-49-23.
		519.7/8	1319.7	Head of Squaw Rapid (La Côlle Falls No.3).
		520.1/8	1318.3	Foot of Squaw Rapid.
		520.3/8	1315.9	Head of Demie Charge Rapids No.4.
		520¼	1312.5	Foot " " " "
190.	1324.312	521.1/8	1311.2	S.E.36-49-23: Head of Rapids No.5
		521¼	1310.2	Foot of Rapids No. 5.
		522.	1307.0	Head " " No. 6.
		522.1/8	1305.3	Foot " " No. 6.
		522.3/8	1303.7	Head of Steep Creek Rapids No. 7.
191.	1322.859	522¼	(1300.2)	N.W.29-49-22: Opposite mouth of Steep Creek.
		523.	1297.0	Foot of Steep Creek Rapids.
		523.1/8	(1295.9)	Head of Rapids No. 8.
		523½	1293.7	Foot " " "
		523¾	1293.2	Head " " No. 9.
		524.	1289.1	Foot " " "
		524¼	1286.9	Head of Horseshoe Rapids No. 10.
192.	1302.949	524¼	1286.6	S.W.28-49-22: 100 yds. below head of Horseshoe Rapids.
		525.1/8	1284.5	Foot of Horseshoe Rapids.
193.	1299.490	525¼	1283.8	N.W.21-49-22: Opposite small Creek
		526.1/8	1277.7	Head of Stony Rapid No. 11
194.	1295.812	526¼	1275.0	S.E.28-49-22: About Middle of Stony Rapids.
		526.3/8	1272.3	Foot of Stony Rapid.
195.	1286.955	527.5/8	1266.6	Cen.22-49-22: Head of Crooked Rapids No. 12.
		528.3/8	1259.1	Foot of Crooked Rapids No. 12.
196.	1275.941	529½	1215.3	N.E.23-49-22: Head of Rapids No. 13
		530.1/8	1246.5	Foot of Rapids No. 13.
		530.3/8	1243.8	Head " " No. 14.
		530¾	1240.0	Foot " " No. 14.
197.	1264.341	531¼	1238.4	S.E.24-49-22: The Forks (Confluence of N.&.S. Saskatchewan Rivers).
198.	1253.934	533.5/8	1229.4	N.W.20-49-21.
		534¾	1226.7	About 200 yds. below foot of low Stony Island.
199.	1248.261	535¼	1224.0	N.W.22-49-21: Head of Bend.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
200.	1239.985	537.3/8	1219.0	S.W.15-49-21: 3/8 mile above steep Rip-Rap Point.
201.	1250.259	539.1/8	1214.2	N.E.15-49-21.
202.	1220.036	540¼	1207.4?	S.W.13-49-21.
203.	1220.301	543½	1196.2?	N.W.36-48-21.
204.	1215.932	545.3/8	1188.4	N.E.30-48-20: West of Small Creek.
205.	1204.621	546.5/8	1185.0	On James Smiths Indian Reserve No. 100.
206.	1209.618	548½	1179.7	On James Smith Indian Reserve No. 100, sharp point about 3 mi. above Fort a la Corne.
207.	1192.079	552.	1170.0	I.R.No.100: Opposite Fort a la Corne Landing about 100 yds. up stream.
208.	1193.822	554.	1164.5	About 500' E. of East Limit of Indian Reserve No. 100
209.	1185.064	555½	1160.5	S.E.36-48-20.
210.	1178.204	558.7/8	1152.6	N.E.7-49-19.
		559.5/8	1150.7	Head of Fort a la Corne Rapids.
		560⅛	1142.9	Foot " " " " "
211.	1170.964	560¼	1141.7	N.E.9-49-19.
		561¼	1138.6	About middle of bend, Sec. 15.
		562¼	1134.7	
		563¼	1132.5	About middle of bend Sec. 11.
212.	1160.759	563¾	1130.4	N.E.11-49-19.
213.	1152.489	566.7/8	1120.5	About middle of Section 17-49-18.
214.	1142.474	569.3/8	1114.0	N.W.22-49-18.
215.	1160.159	572.5/8	1105.3	S.W.19-49-17: About 1000' below head of large Island.
216.	1133.474	574.5/8	1099.9	S.E.30-49-17.
217.	1114.504	577⅛	1085.7	S.E.33-49-17.
218.	1117.469	580⅛	1082.4	N.W.1-50-17.
219.	1108.944	583.	1075.7	N.W.5-50-16.
		584⅛	1071.6	About 1000' above head of Lost River Island.
		585.1/8	1070.4	Foot of Lost River Island.
		586¼	1068.0	Head of Rapid.
220.	1096.164	586½	1067.0	N.W.11-50-16.
		587.	1064.8	Foot of Rapid.
221.	1094.484	588.	1062.3	S.E.12-50-16: Head of Rapid.
		588.7/8	1057.9	Foot of Rapid.
		590.	1055.6	In bend above Cadotte RApids.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
222.	1082.574	591.1/8	1053.5	N.E. 8-50-15: About 1/8 mile above head of Cadotte Rapids.
		591¼	1053.0	Head of Cadotte Rapids.
223.	1088.749	592.	1050.0	S.E.16-50-15.
		592.1/8	1048.8	Foot of Cadotte Rapids.
		593½	1040.7	1½ miles below B.M. 223.
224.	1066.943	595¼	1031.5	N.E.11-50-15: Head of Nipawin Rapids.
225.	1058.044	598¼	1017.0	N.W.18-50-14: Near foot of Nipawin Rapids.
		598.3/8	1016.2	Foot of Nipawin Rapids.
226.	1046.879	600½	1010.5	N.W.30-50-14.
227.	1044.434	601½	1007.5	N.W.31-50-14.
~~228.~~	~~1032.354~~	~~603.5/8~~	~~1003.0~~	S.W.9-51-14.
229.	1042.144	605.5/8	1000.6	N.W.15-51-14.
		607.5/8	996.5	HEad of "The Two Islands".
230.	1033.089	608¾	993.8	S.E.34-51-14: ¾ mile below "Two Islands".
231.	1020.234	610½	988.8	S.W.1-52-14.
232.	1013.354	613.3/8	984.0	N.E.7-52-13.
233.	1018.834	615½	981.0	N.E.9-52-13.
234.	1002.254	618.1/8	976.2	S.E.15-52-13.
235.	1002.889	620.	975.7	N.W.22-52-13.
236.	1001.719	621.5/8	975.4	N.E.23-52-13.
		621¾	975.2	Head of Large Island.
		623¼	972.9	Foot " " "
237.	992.284	625¼	972.0	S.W.31-52-12.
		625.5/8	971.5	Head of Crescent Island.
238.	990.059	626.3/8	970.4	Cen.6-53-12: Near foot of Crescent Island.
		628¼	969.5	Head of Birch Island.
239.	990.464	629.1/8	969.0	S.W.2-53-12.
		630½	968.2	Foot Birch Island (Willow bars).
240.	983.634	631.5/8	967.7	N.E.2-53-12.
241.	984.309	632.5/8	966.8	N.W.11-53-12.
		634¼	965.5	Head of Large Island.
242.	983.724	635.	964.8	N.E.22-53-12.
		636.	964.0	Foot of Large Island.
243.	976.209	638.	962.	N.W.1-54-12: B.M. on North shore Approx. location.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
		638½	960.9	¼ mile above crossing (Ft. of large Island).
244.	968.769	641¼	957.8	S.E.9-54-11.
245.	970.159	643.5/8	955.5	S.E.2-54-11.
246.	966.954	646.7/8	953.1	N.E.31-53-10.
247.	964.044	649.3/8	950.7	On North shore opposite Hat Island.
		649¾	950.3	Head of Tobin Rapids.
248.	957.899	651¼	939.1	
		652⅛	930.5	Foot of Tobin Rapids.
249.	955.939	653¾	924.7	
		654.	923.1	Head of Squaw Rapids, 1st. pitch.
		654.3/8	921.1	Foot of 1st. pitch.
		654.5/8	919.3	Head of 2nd. pitch.
		655¼	916.3	Foot of Squaw Rapids and Head of Squaw Swifts.
250.	931.517	655½	915.3	
		658¼	904.6	T.S.S. 75: Foot of Squaw Swifts.
251.	909.642	660.7/8	902.3	Foot of Island.
252.	920.732	663¼	900.0	Near wide bend.
		665¾	898.0	Sipanock Channel.
253.	920.777	667.1/8	896.7	1.3/8 mile below Sipanock Channel.
"N".	914.940	669.3/8	894.0	Sturgeon River Cut Off (Old Channel).
		670¼	892.8	
254.	909.087	670¾	892.0)	
254A.	909.382	670¾	892.0)	The Cut Off (Old Saskatchewan).
		673¼	889.0	Head of Sand Bar South.
(255).	(905.382)	674.1/8	(888.6)	Foot " " " "
		675.5/8	887.2	Head of Large Island North.
256.	902.647	678.	885.0	Foot of Sand Bar below Point N.
257.	900.457	680¼	882.8	300 yds. below head of Goose Isl.
		682¼	881.1	Foot of Goose Island.
258.	898.972	684.5/8	879.7	Middle of Big Nigger Bar.
		686¼	878.6	Pt. 1½ miles below " N.
259.	896.322	687¾	877.7	Head of Moon Island.
		689.5/8	876.5	Foot " " "
260.	893.587	690.7/8	875.7	Head of Sand Bar South Shore.
		693.3/8	874.3	Foot of Bar in Centre of River.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
261.	893.692	695.7/8	872.9	¾ mile below sharp point.
262.	892.547	697.7/8	871.5	½ mile above point of bend.
		700¼	870.1	Bottom of high Willow Bar South.
		700.7/8	869.8	
263.	889.922	703.3/8	868.2	½ mile below sand bars at point N.
264.	888.547	706.3/8	867.4	¼ mile above sand bars North.
265.	888.052	708¾	866.7	3/8 mile above high Willow Bar S.
266.	887.392	710¾	865.9	3/8 mile above sharp point North Shore.
267.	886.377	712.5/8	865.4	Just above high sand bar (S).
(268)?	(885.257)	715.5/8	864.5	
269.	884.462	718½	863.6	½ mile above point North.
		721½	862.8	Head of high bar 2½ miles above Bigstone River.
270.	883.087	722.1/8		
		722¼	862.5	Head of Long Island.
		724.	862.1	Mouth of Bigstone River.
271.	882.412	724.3/8	862.0	3/8 mile below Bigstone River.
272.	881.732	725½	861.4	Pemican Portage.
272D.	875.950	(725½)		Cumberland House (Lake Elevation).
273.	880.372	728¾	860.5	Middle of Right Bend.
		730½	860.0	Near foot of Island North Shore.
274.	879.147	732.1/8	859.6	5/8 mile above Small Island South.
275.	877.162	734¼	859.0	1 mile below small Island.
		739.	857.5	1st Mouth of Tearing River.
276.	876.447	739.5/8	857.3	5/8 mile below 1st. Mouth of Tearing River near 2nd. Meridian.
277.	875.167	742¼		
		742.3/8	(856.3)	2nd Mouth Tearing River.
278.	875.927	744½	855.6	Middle of Long Island.
279.	875.182	746.	855.5	½ mile above Small Island.
280.	875.132	747¾	855.2	¼ mile anove sharp point North.
281.	874.477	750¼	854.8	
282.	872.867	752.3/8	854.2	250 yds. above Sharp point.
283.	873.232	756½	853.6	¼ mile below "Barrier".
(284)?	(872.017)	758½	853.0	1 mile above half way Island.
285.	871.582	761¼	852.5	¼ mile below " " "

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
(286)?	(871.092)	764.	852.2	1 mile below sharp point (S) and head of bar.
		765¼	851.9	1 mile below Wide Sand Point.
287.	870.177	768.	851.6	¼ mile above sharp point N.
288.	869.777	770¼	851.3	Half way down west side Big Bend.
		772½	851.2	About Northern extremity Big Bend.
289.	868.567	775¼	851.0	In Elbow at Foot of Big Bend.
290.	868.437	777.3/8	850.8	Near middle Section 12-58-28.
291.	868.052	779.5/8	850.5	Middle Section 6-58-27, head of Bar South.
292.	867.417	782.1/8	850.0	
293.	866.872	784.	849.4	In Eddy (Opposite Bar).
294.	866.732	786.	849.2	¼ mile above Outlet to Lake.
295.	866.172	788.7/8	848.3	1.3/8 miles above Island S.
296.	866.227	790¼	847.9	Head of Island S. Shore.
297.	865.207	792¾	847.5	¼ mile above outlet of Reeder Lake.
298.	864.747	793.5/8	847.2	¼ mile below outlet of Reeder Lake.
299.	863.837	796.5/8	846.3	¼ mile below point at Eddy.
300.	862.422	798.3/8	846.1	¼ mile below Island.
301New.	866.894	800½	846.0	Pas River.
302.	866.687	800.7/8	845.4	H.B.Ry. Bridge, Le Pas.
303.	862.840	802.5/8	845.0	N.W.14-56-26.
304.	861.885	804½	844.7	S.W.19-56-25: 1/3 above Little R.
305.	861.835	806.	844.3	N.E.20-56-25.
306.	860.815	807.1/8	844.2	S.E.28-56-25.
307.	860.630	808¼	844.0	S.E.27-56-25.
308.	860.110	809½	843.7	N.E.26-56-25.
309.	859.590	810.3/8	843.6	S.E.25-56-25.
310.	859.350	811¾	843.2	S.W.24-56-25: ¼ mile above small channel right Bank.
311.	859.610	813¼	843.0	N.E.11-56-25.
312.	857.940	814.3/8	842.8	N.E. 2-56-25.
313.	858.430	815¼	842.7	N.E.35-55-25: 1/3 mile above Island.
314.	858.740	816½.	842.3	N.E.26-55-25: ¼ mile below Island.
315.	858.200	818.	841.9	N.W.19-55-24.
316.	857.915	819.3/8	841.6	1/3 mile below Moose Lake or Summerberry River.
317.	856.210	820½	841.0	¼ mile below small channel.
318.	855.485	821¾	840.3	¾ mile above Island.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
319.	855.035	823.	840.0	½ mile below head of island.
320.	855.005	824¼	839.8	500 ft. above foot of island.
321.	854.100	825¼	839.3	¼ mile above outlet of lake.
322.	853.620	826½	839.1	1/3 mile below outlet of lake.
323.	853.350	827.7/8	839.0	2/3 mile above 1st. outlet of lake.
324.	852.195	829.1/8	838.9	Opposite 2nd. outlet of lake.
325.	852.865	830½	838.8	
326.	852.760	831¼	838.7	300 yds. above small channel.
327.	852.300	832.1/8	838.6	2/3 mile below small channel.
328.	851.980	833.	838.5	¾ mile above small channel.
~~329.~~	~~852.280~~	~~833½~~	~~838.4~~	~~300 yds. above small channel.~~
330.	851.665	834.7/8	838.3	At head of Hill Island.
331.	851.235	836.1/8	838.2	
332.	850.035	837.3/8	838.0	
333.	949.990	838.1/8	837.9	¼ mile above foot of Hill Island.
334.	849.455	839.	837.5	300 yds. below foot of Hill "
335.	848.725	839.7/8	836.9	½ mile above Island.
336.	848.150	841¼	836.5	200 ft. below small island.
337.	848.520	842¼	836.2	Opposite small channel.
338.	848.395	843.1/8	836.1	½ mile above Island.
339.	848.185	844.	836.0	1/3 mile below head of Island.
340.	847.225	844.7/8	835.8	¼ mile above foot of Island.
341.	846.780	845.7/8	835.7	200 yds. below foot of Island.
342.	847.115	846.7/8	835.6	5/8 mile above 14th Base Line.
343.	846.420	848.1/8	835.3	2/3 mile below 14th Base Line.
344.	844.985	849.3/8	835.1	Opposite small channel.
345.	844.825	850.5/8	835.0	100 yds. above small channel.
346.	845.870	851¾	834.95	
347.	845.680	852.7/8	834.9	Foot of small island. Pine Point
348.	845.175	854.	834.8	300 yds. above small channel (250' wide).
349.	844.270	855.1/8	834.6	300 yds. above small channel.
350.	840.745	856½	834.5	¾ mile above small channel.
352.	843.535	857.3/8	834.4	200 yds. below small channel.
353.	843.745	858.3/8	834.3	100 yds. below channel (500' wide).
354.	842.720	859.3/8	834.2	Head Duck Island.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
355.	843.190	860¼	834.1	2/3 mile below Duck Island.
356.	843.250	861¼	834.0	100 ft. below head of island.
357.	841.880	862.5/8	833.8	1/3 mile above foot of Kettle Isl.
358.	840.355	863¼	833.7	1/3 mile above small channel.
359.	842.585	864.1/8	833.6	100 ft. below small channel.
360.	842.250	865.3/8	833.3	200 yds. below small island.
361.	840.230	866½	833.0	½ mile above Muddy Lake channel.
362.	839.935	867.5/8	832.9	½ mile below Muddy Lake channel.
363.	838.180	868.5/8	832.6	1 mile above Moose Lake or Summerberry River.
364.	837.725	869½	832.4	300 yds. above Moose Lake or Summerberry River.
365.	837.980	870½	832.0	
365A.	835.770	870¾	831.9	Foot of Sand Bar, South Shore.
366.	840.875	871½	831.7	1/3 mile above channel (400' wide).
367.	838.925	873.	831.4	Near foot of Sand Bar.
368.	837.830	873.7/8	831.3	Near foot of sand bar.
369.	840.030	874½	831.2	1/3 mile above Muddy Lake Outlet.
370.	836.475	875.1/8	831.1	Outlet of Muddy Lake.
370A.	839.100	875.5/8	831.0	100 yds. above H.B.Co. Wharf Chemahawin.
371.	839.430	876¼	830.9	¼ mile ~~ab~~ below H.B.Co. Wharf Chemahawin.
		880¼	830.0	West end of Cedar Lake.
		915.	830.0	East end of Cedar Lake.
		915½	829.9	Head of "The Narrows".
423.	840.849	916.	828.9	Foot of "The Narrows".
424.	839.451	916½	828.8	
		916¾	828.7	Head of Flying Post Rapids.
425.	836.386	917.	827.0	
		917 3/8	826.0	Foot of Flying Post Rapids.
426.	834.176	917.5/8	825.4	
		918.	825.0	
427.	834.311	918.7/8	824.9	
		~~933.3/8~~	~~787.7~~	
		~~933½~~	~~787.6~~	
		~~933.5/8~~	~~787.5~~	
~~441B. (WPSBM)~~	~~808.484~~	~~933.7/8~~	~~787.3~~	~~H.B.Co. Reserve, West end H.B.Co.~~ Tramway.

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
430	833.318	919.7/8	824.9	
431	829.668	920½	824.4	
432	834.091	921.	823.9	
		921.1/8	823.8	Head of Anchor Point Swift.
		921.3/8	821.6	Foot of Anchor Point Swift.
433	827.811	921.5/8	821.5	
434	827.851	921.7/8	821.3	
		922.	819.8	Head of Demicharge Rapids.
		922.3/8	815.8	Foot of Demicharge Rapids.
		922.5/8	815.5	West Side of Cross Lake.
		926½	815.5	East Side of Cross Lake.
		927.1/8	815.1	
		927.3/8	814.8	Head Cross Lake Rapids.
		928¼	811.5	Foot Cross Lake Rapids.
		928.3/4	810.9	
438	820.652	929¼	810.8	
438A (WPSBM)	821.267	929½	809.9	Head Red Rock Rapids.
		929.5/8	808.0	
		929.7/8	805.2	
		930.	804.0	
439	821.669	930¼	800.6	
		930.3/8	799.0	
439A (WPSBM)	808.184	930½	797.2	Foot of Red Rock Rapids.
		930.7/8	796.4	
		931¼	794.8	
440	801.449	931½	794.0	
		931.7/8	793.8	
		932¼	792.1	
		932½	791.7	
441	799.929	932.5/8	790.2	N.W.25-48-14
		932.7/8	788.8	
		933.1/8	788.0	
		933¼	787.8	
		933.3/8	787.7	
		933½	787.6	
		933.5/8	787.5	
441B (WPSBM)	808.484	933.7/8	787.3	H.B.Co. Reserve, West end H.B.CO. Tramway

B.M.	ELEVATION	MILES FROM EDMONTON	LOW WATER PLANE	REMARKS
441C. (WPSBM)	811.544	934.	787.2	S.E.30-48-13: Metering Section.
Near 442.	809.349	934¼	783.0	H.B.Co. Reserve: Head Grand Rapids.
		935.	774.0	
		935.1/8	773.0	Head of island.
		935¼	770.0	Foot of island.
		935½	762.0	
		935¾	756.0	
		936.1/8	750.0	
		936½	746.0	
		936¾	741.0	
		937.1/8	738.0	
		937.3/8	732.0	
		937.5/8	727.0	
		937¾	724.0	
		938.	720.0	
		938½	713.0	Foot Grand Rapids.
		939.	712.0	
449. (WPSBM)	737.460	939¼	711.8	H.B.Co. Reserve: East end H.B.Co. Tramway.
		939¾	710.5	
		941.	709.8	Lake Winnipeg.

TABLE SHOWING FALL OF THE NORTH SASKATCHEWAN RIVER

FROM EDMONTON TO LAKE WINNIPEG.

NOTE: Figures are for the stage of low water adopted for improvements to navigation.

Table V.

FROM	TO	MILES	FALL IN FEET	AVGE. FALL PER MI	REMARKS
Edmonton	Pine Pt. Rapids	21.	38.8	1.8	From C.P.R. High Level Bridge.
Head of Pine Pt. Rapids	Foot of Pine Pt. Rapids	½	1.1	2.2	Swift at ordinary water.
Foot of Pine Pt. Rapids	Head of Small Rapid	11½	21.5	1.9	Tp. Line 55/56.
Head of Small Rapid	Foot of Small Rapid	1½	6.0	4.0	Swift at ordinary water.
Foot of Small Rapid	Head of Vermilion Rapid	9¾	19.0	1.9	Some gravel shoals.
Head of Vermilion Rapid	Foot of Vermilion Rapid	½	2.0	4.0	Stony.
Foot of Vermilion Rapid	Hd. Jump Off & Sucker Series	7.5/8	14.0	1.8	Some gravel shoals.
Hd. Jump Off & Sucker Series	Foot of Sucker Rapid	6.3/8	20.8	3.3	Uniform swift current, stony.
Foot of Sucker Rapid	Head of Victoria Rapids	18¾	39.7	2.1	Clay and stones.
Hd. Victoria Rapids, Pakan	Foot of Victoria Rapids	1¾	8.0	4.6	Main Rap. & Short Rapid at Bar.
Foot Victoria Rapid Series	Hd. White Mud Rapids above wide flat	4.0	10.8	2.7	Good current. Sandstone outcrops on shore.
Hd. White Mud Rapid above wide flat	Ft. White Mud Rapids 3½ miles above Dam site	¼	1.2	4.8	Sandstone outcrop.
Ft. White Mud Rapid 3½ miles above Dam site	Head of Crooked Rapids	21½	28.6	1.3	Rotten sandstone bottom.
Head of Crooked Rapids	Foot of Crooked Rapids	½	4.2	8.4	Boulders.
Foot of Crooked Rapids	Head Small Rapid above Saddle Lake Creek	7.5/8	14.9	2.0	
Head Small Rapid above Saddle Lake Creek	Foot Small Rapid above Saddle Lake Creek	1/8	1.4	10.	Approx.
Foot Small Rapid above Saddle Lake Creek	Foot Gold Island Swifts	5.	13.4	2.7	Some swifts stony bottom.
Foot Gold Island Swifts	Head Eye Rapids	15¼	16.7	1.1	Good river.
Head Eye Rapids	Foot Eye Rapids	3/8	3.5	9.3	Boulders here.
Foot Eye Rapids	Head of Dog Rump Series	29.1/8	32.3	1.1	Good river.
Head of Dog Rump Rapid	Foot of Dog Rump 2nd. Pitch	¾	5.2	6.9	Two pitches followed by two swifts.
Foot of Dog Rump 2nd. Pitch	Foot of Dog Rump Series	1.5/8	4.5	2.8	Two swifts. Stony.
Foot of Dog Rump Series	Head Wolf Pond Rapids	1.1/8	4.3	3.8	Swift water, fair depth.
Head Wolf Pond Rapids	Foot Wolf Pond Rapids	1.3/8	8.3	6.1	Two pitches.
Foot Wolf Pond Rapids	Head Small Rapid	2.3/8	5.5	2.3	

FROM	TO	MILES	FALL IN FEET	AVGE. FALL PER MI.	REMARKS
Head Small Rapid	Foot Small Rapid	1/8	1.3	10.4	
Foot Small Rapid	Head of Moose Rapid No. 1	3.1/8	5.8	1.5	
Head Moose Rapid No. 1	Foot of Moose Rapid No. 1	3/8	2.1	5.6	
Foot Moose Rapid No. 1	Head of Moose Rapid No. 2	3¼	1.9	0.6	
Head Moose Rapid No. 2	Foot of Moose Rapid No. 2	3/8	2.6	6.9	Shallow, both Channels.
Foot Moose Rapid No. 2	Head of Frog Rapid Series	9¾	11.2	1.1	Stony bottom.
Head of Frog Rapid Series	Foot of Frog Rapid Series	3.	5.2	1.7	Three short pitches. Reefs one side river only.
Foot Frog Rapid Series	Lashburn Ferry	57.1/8	53.1	0.9	Alternating sand and gravel.
Lashburn Ferry	Battleford High Bridge	81.5/8	84.5	1.0	Sand bottom.
Battleford	Ceepee Bridge	64.1/8	62.3	1.0	Sand bottom.
Ceepee Bridge	Prince Albert Bridge	99.7/8	76.7	0.75	Sand and gravel.
Prince Albert Bridge	Head Swift Waters	17¾	17.3	1.0	Sand and gravel.
Head Swift Waters	Foot 1st. Small Rapid	¼	1.7	6.8	
Foot 1st. Small Rapid	Head 2nd. Small Rapid	1.	2.2	2.2	
Head 2nd. Small Rapid	Foot 2nd. Small Rapid	¼	2.8	11.2	
Foot 2nd. Small Rapid	Head 3rd. Small Rapid	5.	12.2	2.4	
Head 3rd. Small Rapid	Foot 3rd. Small Rapid	½	3.5	7.0	
Foot 3rd. Small Rapid	Head Peace Rapid in La Colle Falls Series	1¼	3.8	3.0	Stony bottom.
Head of Peace Rapid	Foot of Peace Rapid	1/8	1.5	12.0	
Foot of Peace Rapid	Head Big Stone Rapid	1/8	0.3	2.4	
Head Big Stone Rapid	Foot Big Stone Rapid	¼	3.7	14.8	
Foot Big Stone Rapid	Head Squaw Rapid	3/8	1.2	3.2	
Head Squaw Rapid	Foot Squaw Rapid	¼	1.4	5.6	
Foot Squaw Rapid	Head Demicharge Rapid	¼	2.4	9.6	
Head Demicharge Rapid	Foot Demicharge Rapid	3/8	3.4	9.1	
Foot Demicharge Rapid	Head of Rapid No. 5	3/8	1.3	3.5	
Head Rapid No. 5	Foot of Rapid No. 5	1/8	1.0	8.0	
Foot Rapid No. 5	Head of Rapid No. 6	¾	3.2	4.3	
Head Rapid No. 6 below Dam	Foot of Rapid No. 6 below Dam	1/8	1.7	13.6	
Foot Rapid No. 6	Head Steep Creek Rapid	¼	1.6	6.4	
Head Steep Creek Rapid	Foot Steep Creek Rapid	5/8	6.7	10.7	

FROM	TO	MILES	FALL IN FEET	AVGE. FALL PER MI.	REMARKS
Foot of Steep Creek Rapid	Head of Rapid No. 8	1/8	1.1	8.8	
Head of Rapid No. 8	Foot of Rapid No. 8	3/8	2.2	5.9	
Foot of Rapid No. 8	Head of Rapid No. 9	¼	0.5	2.0	
Head of Rapid No. 9	Foot of Rapid No. 9	¼	4.1	15.0	Approx.
Foot of Rapid No. 9	Head Horseshoe Rapid No. 10	¾	2.2	2.9	
Head of Rapid No. 10	Foot of Rapid No. 10	3/8	2.4	6.4	
Foot of Rapid No. 10	Head of Stony Rapid No. 11	1.	6.8	6.8	
Head of Stony Rapid No. 11	Foot of Stony Rapids No. 11	¼	5.4	20.	Approx. Stony reef North Shore.
Foot of Stony Rapid No. 11	Head of Rapid No. 12 (Crooked Rapid)	1¼	5.7	4.6	
Head of Crooked Rapid No. 12	Foot of Rapid No. 12 (Crooked Rapid)	¾	7.5	10.0	
Foot of Crooked Rapid No. 12	Head of Rapid No. 13	1.1/8	7.8	6.9	
Head of Rapid No. 13	Foot of Rapid No. 13	5/8	4.8	7.7	
Foot of Rapid No. 13	Head of Rapid No. 14 Last Rapid	¼	2.7	10.8	Last rapid of La Colle Falls Series.
Head of Rapid No. 14	Foot of Rapid No. 14 Last Rapid	3/8	3.7	10.1	
Foot of Rapid No. 14	Forks of Saskatchewan	½	1.6	3.2	
Forks	Fort a la Corne Upper Landing	20¾	68.4	3.3	All stony, current strong.
Fort a la Corne	Head of La Corne Rapids	7.5/8	19.3	2.5	
Head of La Corne Rapids	Foot of La Corne Rapids	7/8	7.8	8.9	
Foot of La Corne Rapids	Head of Swift	25¾	74.9	2.9	
Head of 1st. Swift	Foot of 1st. Swift	¾	3.2	4.3	
Foot of 1st. Swift below La Corne Rapid	Head of 2nd. Swift	1.	2.5	2.5	
Head of 2nd. Swift below La Corne Rapid	Foot of 2nd. Swift	7/8	4.4	5.0	
Foot of 2nd. Swift	Head of Cadotte Rapids	2.3/8	4.9	2.1	
Head of Cadotte Rapids	Foot of Cadotte Rapids	7/8	4.2	4.8	Big boulders all across.
Foot of Cadotte Rapids	Head Main Nipawin Rapids	3.1/8	17.3	5.5	Swift water.
Head Main Nipawin Rapids	Foot Main Nipawin Rapids	1¼	10.	8.	Boulders.
Foot Main Nipawin Rapids	Foot Nipawin Swifts	1.7/8	5.3	2.8	Shoals below Nipawin Landing.
Foot Nipawin Swifts	Foot Birch Island Pemmican Point	32.1/8	48.0	1.5	
Foot Birch Island Pemmican Point	Head of Tobin Rapids	19¼	17.9	0.9	
Head of Tobin Rapids	Foot of Tobin Rapids	2¾	19.8	7.2	Very stony.
Foot of Tobin Rapids	Head of Squaw Swifts	1½	7.4	4.9	

FROM	TO	MILES	FALL IN FEET	AVGE. FALL PER MI.	REMARKS
Head of Squaw Swifts	Foot Main Squaw Rapids	1¼	6.8	5.4	Two pitches.
Foot of Squaw Rapids	Foot of Swifts	3.	11.7	3.9	Shallow and stony.
Foot of Swifts	The Cut Off	12½	12.6	1.0	
The Cut Off	Big Stone River Mouth	53¼	29.9	0.6	
Big Stone River Mouth	The Pas	76½	16.1	0.2	
The Pas	Cedar Lake at Duncan Island	79¾	16.0	0.2	
Cedar Lake	The Narrows	35¼	0.1	0.0	
The Narrows	Foot of Narrows	½	1.0	2.0	
Foot of Narrows	Head Flying Post Rapids	¾	0.2	0.3	
Head Flying Post Rapids	Foot Flying Post Rapids	5/8	2.7	4.3	One very shoal pitch.
Foot Flying Post Rapids	Head Anchor Point Swifts	3¾	2.2	0.6	
Head Anchor Point Swifts	Foot Anchor Point Swifts	¼	2.2	8.8	
Foot Anchor Point Swifts	Head Demicharge Rapids	5/8	1.8	2.9	
Head Demicharge Rapids	Foot Demicharge Rapids	3/8	4.0	10.7	Two drops with gradient of 25 ft. to the mile.
Foot Demicharge Rapids	East Cross Lake, Head Cross Lake Rapid	5.	1.0	0.2	
Head Cross Lake Rapid	Foot Cross Lake Rapid	7/8	3.3	3.8	
Foot Cross Lake Rapid	Head Red Rock Rapid	1¼	1.6	1.3	
Head Red Rock Rapid	Foot Red Rock Rapid	1.	12.7	12.7	
Foot Red Rock Rapid	Head Grand Rapids	4.1/8	14.2	3.4	
Head Grand Rapids	Foot Grand Rapids	3.7/8	70.0	18.1	Two drops with gradient of 40 ft. to the mile.
Foot Grand Rapids	Lake Winnipeg	2½	3.2	1.3	

FALL IN RAPIDS	304.1 Feet
FALL IN STRETCHES BETWEEN RAPIDS	988.5 "
TOTAL FALL OF RIVER AT LOW WATER	1292.6 "
DISTANCE EDMONTON TO LAKE WINNIPEG	941 Miles
AVERAGE FALL OF RIVER PER MILE	1.37 Feet

RAPIDS OF THE NORTH SASKATCHEWAN RIVER.

— FROM —

EDMONTON, ALBERTA, TO LAKE WINNIPEG, MANITOBA.

Table VI.

NO.	NAME	LENGTH (Miles)	FALL (Feet)	REMARKS
1.	Pine Point Rapid	½	1.1	21 Miles below Edmonton.
2.	Small Rapid (No name)	1½	6.0	About 2½ mi. below Sturgeon
3.	Little Vermilion Rapid	½	2.0	River.
4.	Jump Off & Sucker Rapid	6.3/8	20.8	Short stretches of swift
5.	Victoria Rapids. Series.	1¼	8.0	Below Pakan. -water between
6.	White Mud Rapids	¼	1.2	3½ mi. above Dam Site.-rap's
7.	Crooked Rapids	½	4.2	
8.	Small Rapid (No name)	1/8	1.4	Above mouth Saddle Lake
9.	Eye Rapids	3/8	3.5	Creek.
10.	Dog Rump Series	2.3/8	9.7	
11.	Wolf Pond Rapids	1.3/8	8.3	
12.	Small Rapid (No name)	1/8	1.3	
13.	Moose Rapid No. 1	3/8	2.1	
14.	" " No. 2	3/8	2.6	
15.	Frog Rapids	3	5.2	(Last of series between
16.	Small Rapid No. 1	¼	1.7	Edmonton and Prince Albert)
17.	" " No. 2	¼	2.8	
18.	" " No. 3	½	3.5	
19.	Peace Rapid No. 1	1/8	1.5	First of La Colle Falls
20.	Big Stone Rapid No. 2	¼	3.7	Series.
21.	Squaw Rapid No. 3	¼	1.4	
22.	Demiecharge Rapid No. 4	3/8	3.4	
23.	Rapid No. 5	1/8	1.0	
24.	" No. 6	1/8	1.7	
25.	Steep Creek Rapid No. 7	5/8	6.7	
26.	Rapid No. 8	3/8	2.2	
27.	Rapid No. 9	¼	4.1	
28.	Horseshoe Rapid No. 10	3/8	2.4	
29.	Stony Rapid No. 11	¼	5.4	
30.	Crooked Rapid No. 12	¼	7.5	
31.	Rapid No. 13	5/8	4.8	
32.	Rapid No. 14	3/8	3.8	Last of La Colle Falls
33.	Fort a la Corne Rapid	7/8	7.8	Series.
34.	1st.Rap.below Ft.a la Corne	½	3.2	
35.	2nd. " " " " "	7/8	4.4	
36.	Cadotte Rapids	7/8	4.2	
37.	Nipawin Rapid (series)	3.1/8	15.3	
38.	Tobin Rapids	2¼	19.8	
39.	Squaw Rapids	1¼	6.8	
40.	Squaw Swifts	3	11.7	(Last Rap. between Pr.Albert
41.	Narrows Rapids	½	1.0	& Le Pas.Rocky shoals extend
42.	Flying Post Rapid	5/8	2.7	partly across river below
43.	Anchor Pt. Rapid	¼	2.2	Le Pas at Poplar Pt.Frying
44.	Demiecharge Rapid	3/8	4.0	Pan, Hill Isd.& Wooden Tent
45.	Cross Lake Rapids	7/8	3.3	Causing rough water at these
46.	Red Rock Rapid	1	12.7	places when river is low).
47.	Grand Rapids	3.7/8	70.0	Foot of Rapids 2½ miles
				above mouth of River (Lake
				Winnipeg).

TOTAL FALL IN RAPIDS: 304.1

NORTH SASKATCHEWAN RIVER SURVEY.

DREDGING

EDMONTON TO LAKE WINNIPEG.

Table VII.

Refer to Plates 1-59.

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
0-1.	289,600		21,650		21,650
1-2.	145,600		6,300		6,300
2-3.	179,600		6,600		6,600
3-4.	116,000		5,350		5,350
4-5.	676,800		54,500		54,500
5-6.	520,800		27,400		27,400
6-7.	240,000		17,850		17,850
7-8.	176,000		14,550		14,550
8-9.	686,800		49,450		49,450
9-10	628,400		51,950		51,950
10-11	364,000	3,200	38,700		41,900
11-12	803,700	7,700	82,000		89,700
12-13	806,400	2,850	71,200		74,050
13-14	762,800	4,950	79,500		84,450
15-16	606,000		48,050	23,200	71,250
16-17	260,000	700	18,500		19,200
17-18	676,000	4,950	61,550		66,500
18-19	448,000		38,500		38,500
19-20	716,000	4,150	72,900		77,050
20-21	346,000		23,300		23,300
21-22	464,000		67,150		67,150
22-23	452,000	1,950	42,300		44,250
23-24	806,000	900	61,450		62,350
24-25	710,000		59,750		59,750
25-26	724,800		63,000		63,000
26-27	372,800		30,700		30,700
					1,168,700

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					1,168,700
27-28.	378,800	2,100	40,000		42,100
28-29.	664,000		71,600		71,600
29-30.	574,800	1,700	60,850		62,550
30-31.	530,800	3,300	25,500		28,800
31-32.	645,200		53,250		53,250
32-33.	90,800		3,350		3,350
33-34.	732,000	12,000	67,300		79,300
34-35.	444,700	12,900	57,500		70,400
35-36.	424,400	3,500	31,100		34,600
36-37.	685,600		39,050		39,050
37-38.	780,000	1,500	61,100		62,600
38-39.	808,800	8,150	78,000		86,150
39-40.	453,200		37,000		37,000
40-41.	835,600	3,800	88,650		92,450
41-42.	516,000	1,000	44,350		45,350
42-43.	516,000		34,250		34,250
43-44.	578,400		40,600		40,600
44-45.	482,400	3,900	37,450		41,350
45-46.	192,000		24,150		24,150
46-47.	752,400		62,550		62,550
47-48.	830,000	2,200	89,450		91,650
48-49.	575,200		50,400		50,400
49-50.	358,800		39,850		39,850
50-51.	704,800		56,700		56,700
51-52.	618,800	4,300	60,900		65,200
52-53.	674,000	7,600	70,000		77,600
53-54.	665,200		52,900		52,900
54-55.	610,000	2,000	64,000		66,000
55-56.	750,000		96,600		96,600
56-57.	581,600		49,300		49,300
57-58.	252,000		9,350		9,350
					2,835,700

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					2,835,700
58-59.	684,000	4,000	58,350		62,350
59-60.	500,900	450	20,600		21,050
60-61.	648,000		41,600		41,600
61-62.	535,000		28,700		28,700
62-63.	381,200		19,850		19,850
63-64.	202,000	750	9,550		10,300
64-65.	257,000		21,500		21,500
65-66.	676,800		87,550		87,550
66-67.	742,800		51,900		51,900
67-68.	725,200		54,500		54,500
68-69.	136,400		3,750		3,750
69-70.	200,800	400	7,050		7,450
70-71.	40,000		750		750
72-73.	552,800		62,050		62,050
73-74.	632,800		41,250		41,250
74-75.	212,000		7,600		7,600
76-77. Pakan.	606,800		39,400		39,400
77-78. Pakan.	546,400	3,000	58,450		61,450
78-79.	812,800		79,050		79,050
79-80.	69,200		7,300		7,300
80-81.	178,000	650	3,800		4,450
82-83.	520,800		50,450		50,450
83-84.	345,500		19,900		19,900
84½-85	454,000		34,250		34,250
85-86.	12,000		900		900
88-89.	12,000		450		450
89-90.	120,000		4,450		4,450
91-92.	356,000		32,600		32,600
92-93.	22,000		800		800
93-94.	212,500		10,700		10,700
					3,704,000

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					3,704,000
94-95.	436,000		27,000		27,000
95-96.	736,000		60,200		60,200
96-97.	600,000		30,900		30,900
97-98.	596,000		41,750		41,750
98-99.	577,000		33,900		33,900
99-100	786,000		84,300		84,300
100-101	752,000		58,650		58,650
101-102	548,000		46,200		46,200
102-103	594,000		45,150		45,150
103-104	712,000		49,100		49,100
104-105	424,000		37,700		37,700
105-106	500,000	11,250	26,150		37,400
106-107	222,000	650	16,950		17,600
107-108	518,000		30,550		30,550
108-109	246,000		8,550		8,550
111-112	494,000	9,000	40,900		49,900
112-113	302,000		11,150		11,150
113-114	88,000	500	6,000		6,500
114-115	490,000	4,550	45,350		49,900
115-116	241,000	200	8,650		8,850
116-117	124,000	300	4,300		4,600
117-118	692,000	4,050	70,000		74,050
118-119	417,000		34,450		34,450
119-120	666,000		58,050		58,050
120-121	484,000		27,700		27,700
121-122	566,000		42,250		42,250
122-123	708,000		71,950		71,950
123-124	600,000		46,950		46,950
124-125	354,000		20,100		20,100
125-126	236,000		13,100		13,100
126-127	520,000		35,650		35,650
					4,868,100

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					4,868,100
127-128	776,000		67,850		67,850
128-129	618,000		34,600		34,600
129-130	376,000		15,800		15,800
130-131	185,000		4,350		4,350
131-132	28,000		500		500
132-133	380,000		31,600		31,600
133-134	287,000	4,400	15,550		19,950
134-135	362,000		28,150		28,150
139-140	216,000		16,000		16,000
140-141	632,000		33,950	13,500	47,450
144-145	64,400		2,850		2,850
145-146	530,000		27,400	20,750	48,150
146-147	127,000		3,100	3,100	6,200
147-148	498,000		31,350	31,350	62,700
148-149	816,000		48,700	48,700	97,400
149-150	784,000		51,200	51,200	102,400
150-151	636,000		19,650	19,650	39,300
151-152	796,000		38,100	38,100	76,200
152-153	782,000		44,750	44,750	89,500
154-155	332,000		18,450		18,450
155-156	144,000		4,400		4,400
156-157	150,000		3,550		3,550
157-158	458,000		23,300		23,300
158-159	604,000		48,850		48,850
159-160	613,000		41,800		41,800
160-161	496,000		32,850		32,850
161-162	306,000		15,200		15,200
162-163	496,800	450	23,350		23,800
163-164	562,000	9,900	39,600		49,500
					5,920,750

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					5,920,750
164-165	216,000	6,000	18,000		24,000
165-166	730,000	16,850	60,300		77,150
166-167	527,000	7,350	33,400		40,750
167-168	460,000	10,550	39,450		50,000
168-169	429,000	2,250	24,250		26,500
169-170	316,000	1,000	19,900		20,900
170-171	150,000	2,000	8,350		10,350
171-172	120,000		6,750		6,750
172-173	237,000		14,500		14,500
173-174	806,000		96,950		96,950
174-175	336,000	8,450	12,650		21,100
175-176	20,000		400		400
176-177	198,000		10,700		10,700
177-178	504,000		36,650	19,750	56,400
178-179	207,000		2,800	4,950	7,750
179-180	232,000		4,250	9,000	13,250
180-181	68,000		500	2,000	2,500
181-182	242,000			15,600	15,600
183-184	442,000			28,950	28,950
184-185	5,000		100		100
185-186	245,600			15,300	15,300
186-187	392,000		10,550	17,200	27,750
187-188	304,000		4,300	9,100	13,400
188-189	70,800	1,500	4,400		5,900
189-190	214,000			14,850	14,850
190-191	48,000		600	650	1,250
191-192	36,000			650	650
193-194	374,000		7,350	20,150	27,500
194-195	74,000			2,600	2,600
195-196	432,000		2,500	18,550	21,050
					6,575,600

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					6,575,600
196-197	420,000			27,050	27,050
197-198	240,000			10,900	10,900
198-199	254,000			11,600	11,600
199-200	800,000			65,550	65,550
200-201	574,000			53,950	53,950
201-202	688,000			46,100	46,100
202-203	396,000			25,800	25,800
203-204	402,000			24,150	24,150
204-205	188,000			13,700	13,700
205-206	726,000			49,950	49,950
206-207	244,000			8,750	8,750
207-208	254,000			11,950	11,950
208-209	336,000			32,000	32,000
209-210	614,000			40,900	40,900
210-211	440,000			33,800	33,800
211-212	108,000			4,000	4,000
212-213	352,000			20,000	20,000
213-214	251,200			22,300	22,300
214-215	548,000			50,200	50,200
215-216	470,000			24,750	24,750
216-217	464,000		8,350	27,900	36,250
217-218	326,000		2,100	19,300	21,400
218-219	92,000			6,150	6,150
219-220	454,000			35,700	35,700
220-221	788,000		5,300	99,800	105,100
221-222	726,000		2,000	47,200	49,200
222-223	694,000			48,700	48,700
223-224	516,000		6,650	42,900	49,550
224-225	362,000		11,650	11,500	23,150
225-226	22,000			400	400
					7,528,600

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					7,528,600
226-227	120,000		5,550	5,550	11,100
227-228	642,000		21,100	22,750	43,850
228-229	620,000		21,300	23,350	44,650
229-230	164,000		4,750	3,000	7,750
230-231	49,000			950	950
231-232	8,000		150		150
232-233	116,000	250	5,700		5,950
233-234	228,000	200	7,900		8,100
236-237	90,000		650	2,100	2,750
237-238	630,000		10,850	22,850	33,700
238-239	516,000		15,550	15,550	31,100
239-240	426,000		26,900	26,900	53,800
241-242	316,000		4,450	17,700	22,150
242-243	320,000			14,150	14,150
243-244	342,000		3,450	17,800	21,250
244-245	768,000			78,900	78,900
245-246	306,000		11,350	14,900	26,250
246-247	416,000		17,000	17,000	34,000
248-249	798,000			99,700	99,700
249-250	656,000			73,300	73,300
250-251	776,000			85,500	85,500
251-252	722,000		4,900	59,300	64,200
252-253	706,000		15,500	35,900	51,400
253-254	508,000		11,200	22,500	33,700
254-255	592,000		22,100	43,900	66,000
255-256	232,000		3,300	3,500	6,800
256-257	406,000		9,900	20,000	29,900
257-258	504,000		18,650	18,750	37,400
258-259	504,000		15,000	24,600	39,600
259-260	160,000			7,800	7,800
					8,564,450

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					8,564,450
260-261	576,000		11,000	25,800	36,800
261-262	367,000			19,450	19,450
262-263	456,000		5,500	13,100	18,600
264-265	382,000		7,500	15,950	23,450
265-266	372,000		1,900	20,600	22,500
266-267	492,000		10,300	26,050	36,350
267-268	251,200		3,000	8,650	11,650
268-269	488,000		4,350	34,000	38,350
269-270	594,000		7,350	23,100	30,450
270-271	644,000		13,150	32,000	45,150
271-272	564,000		7,350	43,550	50,900
272-273	746,000		10,000	69,250	79,250
273-274	718,000		5,500	69,850	75,350
274-275	764,000			73,900	73,900
275-276	764,000		23,750	47,550	71,300
276-277	680,000		7,200	66,900	74,100
277-278	634,000		5,050	49,600	54,650
278-279	696,000		5,900	51,350	57,250
279-280	252,000		1,000	14,350	15,350
280-281	616,000			41,550	41,550
281-282	714,000		5,350	51,350	56,700
282-283	622,000			42,350	42,350
283-284	370,000			25,300	25,300
284-285	214,000			6,350	6,350
285-286	318,000			15,150	15,150
286-287	296,000		6,350	8,100	14,450
287-288	636,000		8,150	57,950	66,100
288-289	454,000		10,000	36,800	46,800
289-290	472,000			38,700	38,700
290-291	400,000			22,100	22,100
					9,774,800

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					9,774,800
291-292	682,000			68,550	68,550
292-293	366,000			23,550	23,550
293-294	350,000			16,750	16,750
294-295	396,000		1,400	21,100	22,500
295-296	366,000		2,000	29,950	31,950
296-297	670,000		13,250	42,850	56,100
297-298	584,000		9,450	37,400	46,850
298-299	724,000		24,350	55,800	80,150
299-300	424,000		4,900	22,650	27,550
300-301	472,000		5,000	35,300	40,300
301-302	286,000		2,950	22,250	25,200
302-303	368,000		4,100	30,000	34,100
303-304	462,000		2,300	29,250	31,550
304-305	531,600		250	41,600	41,850
305-306	330,000		6,700	14,000	20,700
306-307	610,000		14,300	33,300	47,600
307-308	702,000		22,600	44,900	67,500
308-309	566,000		12,000	29,600	41,600
309-310	558,000		9,950	30,000	39,950
310-311	798,000		24,500	45,250	69,750
311-312	774,000		23,850	47,650	71,500
312-313	600,000		18,150	36,050	54,200
313-314	330,000		3,300	28,000	31,300
314-315	472,000		5,450	26,500	31,950
315-316	728,000		10,050	40,100	50,150
316-317	516,000		11,600	38,700	50,300
317-318	486,800		9,800	24,550	34,350
318-319	508,000		6,650	25,700	32,350
319-320	566,000		5,550	33,500	39,050
320-321	394,000		3,850	31,050	34,900
					11,038,900

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					11,038,900
321-322	582,000		4,300	52,350	56,650
322-323	502,000		1,650	31,350	33,000
323-324	398,000		2,550	31,000	33,550
324-325	658,000		2,000	55,600	57,600
325-326	496,000			48,300	48,300
326-327	262,000		850	14,750	15,600
327-328	386,000		1,100	33,500	34,600
328-329	636,000			40,050	40,050
329-330	532,000			43,050	43,050
330-331	622,000			56,000	56,000
331-332	348,000			30,550	30,550
332-333	680,000			65,100	65,100
333-334	611,000			49,200	49,200
334-335	516,000			43,200	43,200
335-336	268,000			20,800	20,800
336-337	586,000			64,000	64,000
337-338	662,000			59,400	59,400
338-339	290,000			19,400	19,400
339-340	632,000			51,950	51,950
340-341	356,000		2,600	21,150	23,750
341-342	380,000		6,200	14,300	20,500
342-343	468,000		10,150	33,950	44,100
343-344	354,000		1,000	22,500	23,500
344-345	348,000		700	18,050	18,750
345-346	122,000		4,550	4,500	9,050
346-347	188,000		4,000	5,050	9,050
347-348	522,000		11,300	22,750	34,050
348-349	470,000		9,850	30,650	40,500
349-350	328,000			15,700	15,700
					12,099,850

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					12,099,850
350-351	432,400		5,500	14,950	20,450
351-352	500,000		10,250	20,950	31,200
352-353	404,000		3,100	26,350	29,450
353-354	294,000		4,750	14,500	19,250
354-355	502,000		7,600	31,900	39,500
355-356	436,400		5,250	16,400	21,650
356-357	364,000		1,800	32,450	34,250
357-358	350,000		3,400	23,500	26,900
358-359	296,000		8,000	17,100	25,100
359-360	624,000			46,150	46,150
360-361	152,000		2,600	4,950	7,550
361-362	472,000		8,550	25,700	34,250
362-363	404,000		900	26,850	27,750
363-364	170,000		5,500	11,750	17,250
364-365	424,000			21,950	21,950
365-366	418,000		650	20,700	21,350
366-367	436,000		10,150	23,500	33,650
367-368	300,000		9,950	19,800	29,750
368-369	212,000		2,100	10,750	12,850
369-370	496,000		11,000	24,200	35,200
370-371	526,000		12,950	31,350	44,300
371-372	292,000		2,650	12,750	15,400
372-373	446,000		2,500	24,250	26,750
373-374	174,000		5,000	11,000	16,000
374-375	240,000		6,800	13,800	20,700
375-376	376,000		7,300	15,700	23,000
376-377	458,000		7,950	38,850	46,800
377-378	502,000		4,350	35,250	39,600
378-379	208,000		1,600	15,650	17,250
379-380	404,000		1,450	36,800	38,250
					12,923,350

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					12,923,350
380-381	304,000		8,700	17,500	26,200
381-382	484,000		15,500	32,850	48,350
382-383	334,000			27,650	27,650
383-384	446,000		1,800	23,750	25,550
384-385	362,000		6,050	19,550	25,600
385-386	458,400		3,350	31,000	34,350
386-387	188,000		1,800	11,000	12,800
387-388	524,000		1,050	36,400	37,450
388-389	394,000		10,000	31,800	41,800
389-390	358,000		3,800	25,250	29,050
390-391	424,400		6,550	23,000	29,550
392-393	178,000		900	9,000	9,900
393-394	120,000		400	4,000	4,400
394-395	36,000			700	700
395-396	156,000		5,800	11,550	17,350
396-397	154,000		3,800	7,600	11,400
397-398	268,000		5,450	10,850	16,300
398-399	306,000		7,900	17,100	25,000
399-400	342,000		8,450	16,900	25,350
400-401	532,000		13,500	27,850	41,350
401-402	430,000		15,000	30,300	45,300
402-403	52,000			1,900	1,900
403-404	336,000		2,500	23,400	25,900
404-405	418,000		1,950	16,000	17,950
405-406	348,000		8,650	18,150	26,800
406-407	258,000		5,050	5,250	10,300
407-408	296,000		6,550	7,400	13,950
408-409	272,000		6,200	6,300	12,500
409-410	214,000		7,900	8,000	15,900
410-411	56,000		2,050	2,100	4,150
					13,588,100

MILE	AREA Sq.Ft	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					13,588,100
411-412	184,000		4,100	5,450	9,550
412-413	136,000		5,000	5,100	10,100
413-414	388,800		10,650	11,000	21,650
414-415	232,000		8,750	8,800	17,550
415-416	240,000		10,000	10,900	20,900
416-417	180,000		3,200	3,300	6,500
417-418	262,000		12,000	13,050	25,050
418-419	6,000			100	100
419-420	42,000		500	1,050	1,550
420-421	48,000		600	1,200	1,800
421-422	216,000		4,850	9,700	14,550
422-423	124,000		1,300	2,550	3,850
423-424	300,000		3,700	7,400	11,100
424-425	258,000		3,200	6,350	9,550
425-426	224,000		2,700	5,600	8,300
426-427	88,000		1,600	3,300	4,900
427-428	302,000		10,300	20,650	30,950
428-429	52,000		300	700	1,000
429-430	350,000		5,500	13,400	18,900
430-431	60,000		700	1,500	2,200
431-432	74,000		1,750	1,800	3,550
432-433	76,400		1,400	1,400	2,800
433-434	16,000		300	300	600
434-435	240,000		10,600	10,600	21,200
436-437	178,000		3,100	3,250	6,350
437-438	116,000		3,050	3,150	6,200
438-439	74,000		1,350	1,400	2,750
439-440	232,000		3,900	4,000	7,900
					13,859,500

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS. Cu.Yds.
					13,859,500
441-442	18,000		150	200	350
442-443	8,000		150	150	300
443-444	284,000		14,550	14,600	29,150
444-445	60,000		700	1,400	2,100
445-446	290,000		6,650	13,350	20,000
446-447	446,000		8,100	16,100	24,200
447-448	198,000		2,400	4,950	7,350
448-449	216,000		4,700	9,300	14,000
449-450	228,000		4,650	9,300	13,950
451-452	222,000		6,800	13,650	20,450
452-453	424,000		13,800	17,850	31,650
453-454	286,000		7,900	12,850	20,750
454-455	114,000		2,000	4,350	6,350
455-456	226,000		11,450	14,000	25,450
456-457	336,000		15,750	23,600	39,350
457-458	570,000		26,000	28,800	54,800
458-459	178,000	100	7,500	7,500	15,100
459-460	196,000	1,250	5,300	5,300	11,850
460-461	190,000	1,200	7,200	7,300	15,700
461-462	134,000		2,500	2,500	5,000
462-463	188,000	100	5,900	6,500	12,500
463-464	80,000		1,550	1,800	3,350
464-465	228,000		2,900	3,800	6,700
465-466	170,000		5,050	5,400	10,450
466-467	158,000		5,700	6,000	11,700
467-468	158,000	1,050	[illegible]000	3,000	7,050
468-469	116,000	500	2,550	2,550	5,600
470-471	304,000	700	6,800	8,200	15,700
471-472	46,000		500	950	1,450
					14,291,850

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu. Yds.
					14,291,850
472-473	168,000		4,000	5,350	9,350
473-474	208,000		3,200	5,300	8,500
474-475	294,000	650	9,000	10,700	20,350
477-478	180,000	150	1,700	1,900	3,750
478-479	82,000		1,100	1,250	2,350
479-480	148,000		3,350	3,550	6,900
480-481	264,000		7,500	8,450	15,950
481-482	90,000		1,650	1,700	3,350
482-483	30,000			550	550
484-485	256,000		9,000	10,400	19,400
485-486	154,000	500	5,300	5,650	11,450
486-487	108,000	600	4,700	4,700	10,000
487-488	40,000		500	1,000	1,500
488-489	16,000			300	300
491-492	144,000	700	5,000	5,000	10,700
492-493	490,000	2,700	10,000	10,050	22,750
493-494	66,800		2,685		2,685
494-495	690,000		33,200	39,704	72,904
495-496	714,800		28,408	33,652	62,060
496-497	605,200		25,000	28,950	53,950
497-498	216,600			15,496	15,496
498-499	55,600			1,955	1,955
499-500	189,400			10,141	10,141
500-501	92,800		3,163		3,163
501-502	170,000			20,260	20,260
502-503	394,000			15,444	15,444
503-504	14,400			533	533
504-505	558,800		3,690	35,703	39,393
505-506	583,600	915	18,297	12,784	31,996
506-507	305,200	260	13,657	520	14,437
					14,783,417

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					14,783,417
507-508	142,200		120	7,721	7,841
508-509	478,400		7,040	25,334	32,374
509-510	96,400	2,337		126	2,463
510-511	516,800	8,000	20,828		28,828
511-512	248,000		7,835		7,835
512-513	650,800	12,260	36,456		48,716
513-514	33,200	860	185		1,045
514-515	129,600	2,520	3,015		5,535
515-516	188,800		12,266		12,266
516-517	99,200		3,674		3,674
522-523	301,200	8,400	25,100		33,500
532-533	160,700	1,000	3,200		4,200
533-534	56,000	300	700		1,000
534-535	134,000	1,200	3,800		5,000
535-536	216,400	10,900			10,900
536,537	18,800	400			400
538-539	208,400	5,200			5,200
539-540	31,400	600			600
545-546	94,100	2,000		1,400	3,400
546-547	15,000	300			300
547-548	72,800	2,500			2,500
548-549	102,800	1,900			1,900
549-550	203,200	7,500			7,500
550-551	355,200	24,400			24,400
551-552	84,400	1,100		500	1,600
553-554	200,800	9,000		9,400	18,400
555-556	30,400			23,000	23,000
5565557	191,600		8,400	5,800	14,200
558-559	54,000			2,000	2,000
559-560	339,700		24,800		24,800
					15,118,794

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu. Yds.
					15,118,794
560-561	488,400		42,500		42,500
561-562	122,400		9,100		9,100
562-563	222,400		6,800	3,600	10,400
563-564	24,100		500		500
564-565	314,000			19,900	19,900
565-566	229,200		14,300		14,300
567-568	110,800		2,000		2,000
568-569	167,200		6,000		6,000
569-570	98,800		6,500		6,500
570-571	216,000		3,600	6,200	9,800
571-572	346,000		16,900	17,600	34,500
572-573	545,600		25,200	2,200	27,400
573-574	106,400			3,700	3,700
574-575	44,000		3,300		3,300
575-576	421,600		19,800	19,600	39,400
576-577	213,600		13,700	3,700	17,400
578-579	88,800		3,300		3,300
579-580	78,400		200	2,500	2,700
580-581	124,800		4,400		4,400
581-582	126,000		4,100		4,100
583-584	90,000		3,400		3,400
584-585	585,600		31,500	17,800	49,300
586-587	331,200		14,800	10,400	25,200
587-588	19,200		1,000		1,000
588-589	686,200		36,100	14,600	50,700
591-592	496,000		43,600	10,600	54,200
592-593	294,000		7,800	5,800	13,600
593-594	211,600	3,200	9,600		12,800
594-595	175,200	3,400	10,000		13,400
595-596	423,200	9,900	29,600		39,500
					15,643,094

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					15,643,094
596-597	189,200	4,200	12,500		16,700
597-598	152,800	2,200	6,500		8,700
598-599	86,000	800	2,400		3,200
599-600	353,600		21,400		21,400
600-601	273,200		12,000		12,000
601-602	493,600		22,700	10,400	33,100
656-657	430,000		39,700		39,700
657-658	480,000		24,600		24,600
658-659	26,000		500		500
665-666				23,300	23,300
666-667	134,000			9,900	9,900
670-671				30,250	30,250
671-672				106,400	106,400
672-673				68,200	68,200
673-674				73,900	73,900
674-675				88,450	88,450
675-676				68,200	68,200
676-677				64,000	64,000
677-678				37,750	37,750
678-679				58,500	58,500
679-680				63,300	63,300
680-681				40,550	40,550
681-682				100,500	100,500
682-683				92,250	92,250
683-684				67,350	67,350
684-685				62,900	62,900
685-686				59,850	59,850
686-687				55,850	55,850
687-688				48,600	48,600
688-689				70,850	70,850
					17,093,844

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					17,093,844
689-690				38,750	38,750
690-691				30,550	30,550
691-692				51,400	51,400
692-693				48,600	48,600
693-694				64,450	64,450
694-695				57,200	57,200
695-696				33,500	33,500
696-697				42,200	42,200
697-698				51,750	51,750
698-699				42,200	42,200
699-700				48,750	48,750
700-701				62,350	62,350
701-702				71,500	71,500
702-703				62,000	62,000
703-704				64,500	64,500
704-705				23,000	23,000
705-706				32,250	32,250
706-707				59,000	59,000
707-708				38,450	38,450
708-709				49,600	49,600
709-710				31,100	31,100
710-711				44,450	44,450
711-712				40,000	40,000
712-713				33,600	33,600
713-714				37,900	37,900
714-715				41,250	41,250
715-716				45,400	45,400
716-717				47,750	47,750
717-718				26,500	26,500
					18,413,794

MILE	AREA Sq.Ft.	BOULDERS Cu.Yds.	STONES GRAVEL & CLAY Cu.Yds.	SAND & MUD Cu.Yds.	TOTALS Cu.Yds.
					18,413,794
718-719				37,750	37,750
719-720				32,100	32,100
720-721				25,550	25,550
721-722				56,000	56,000
722-723				72,900	72,900
723-724				78,500	78,500
724-725				5,000	5,000
LE PAS TO CEDAR LAKE (DUNCAN ISLAND) 10 Ft. Navigation.					
		SOLID ROCK Cu.Yds.			
840-841	124,000		4,600		4,600
868-869	126,000	2,700		2,000	4,700
869-870	108,000		3,000	4,900	7,900
870-871	68,000		2,000	3,000	5,000
871-872	175,000		9,700		9,700
872-873	268,000	600	14,000	4,700	19,300
873-874	352,000	8,000	20,900	600	29,500
874-875	456,000	11,800	21,100		32,900
877-878	120,000		4,400		4,400
878-879	390,000	8,000	14,900		22,900
879-880	640,000	15,800	50,800	3,000	69,600
CEDAR LAKE TO LAKE WINNIPEG.					
880-881	44,000	600	1,000		1,600
915-916	926,000	43,400			43,400
927-929	694,000	141,000			141,000
939-940	705,000	65,280			65,280

TOTAL DREDGING EDMONTON TO LAKE WINNIPEG ------ 19,183,374 C.Yds.

NORTH SASKATCHEWAN RIVER SURVEY

LIST OF GAUGES.

1910 - 1915

Table VIII.

MILEAGE	PLACE	DATE SET	ELEV. OF ZERO	REMARKS
	Rocky Mountain House	6 June-11	3113.487	A.C.Ry. Datum. Gauge at Guy's Ferry.
	" " "	13 June-12	3114.442	A.C.Ry. Datum. Gauge at Austin's Ferry.
	" " "	26 July-12	3116.352	A.C.Ry. Datum. Gauge at Austin's Ferry.
2	Edmonton		1999.408	Edmonton Lumber Co's. gauge.
2	"	1 July-10	1995.668	Gauge No. 1 on boom pier opposite Edmonton Lumber Co's. Mill.
2	"	5 Oct.-10	1997.168	Gauge No. 2 on pier above gauge No. 1 Low water gauge.
2	"	14 Mar.-11	1991.728	On pier just above Edmonton Lumber Co's. Mill.
0¼	"	19 Apr.12?	2000.8	Gauge near Walter's Mill. Lost in flood 8th July-12.
0	"		1999.3	C.P.R. Gauge.
25½	L'Amoureux	1 July-11		Not tied in. Carried away by flood 8th July-11.
76¾	Pakan	12 Aug.-10	1840.555	Near ferry.
76¾	"	2 July-11	1841.905	
76¾	"	15 June-12	1839.43	200' below Ferry. Opposite B.M. 19A.
76¾	"	17 June-12	1835.858	The above gauge reset by gauge keeper.
76¾	"	21 June-12	1842.765	
76¾	"	7 July-12	1840.965	
103¼	Desjarlais Ferry	2 July-11	1797.29	
103¼	"	16 Oct.-11	1794.8	Approx. zero.
124½	Duvernay	7 Aug.-10	1746.510	A little below ferry.
124½	"	3 July-11	1748.995	
124½	"	13 June-12	1746.089	A little below ferry. Opposite B.M. 35.
124½	"	8 July-12	1746.491	A little below ferry. Opposite B.M. 35.
124½	"	10 July-12	1746.100	A little below ferry. Opposite B.m. 35.
124½	"	10 July-12	1746.165	Check 22nd. July-12.
124½	"	22 July-12	1746.995	
158¾	Hopkins	3 July-11	1711.315	
194¾	Vermilion Ferry (Lea Park)	3 July-11	1642.512	Gauge in Vermilion River.
194¾	Vermilion River (Lea Park)	7 June-12	1638.750	Gauge in Saskatchewan River 100' below Ferry. Right bank of river.
194¾	"	7 June-12	1638.672	Gauge in Saskatchewan River. Check 3rd. Aug.-12.
194¾	"	3 July-11	1643.172	Gauge in Vermilion River. Check 3rd. Aug.-12.

MILEAGE	PLACE	DATE SET	ELEV. OF ZERO	REMARKS
219	Hewitt Landing	4 Aug.-10	1623.509	Lost in flood 9th Sept.-10.
219	"	4 July-11	1622.449	100' below Ferry Landing. Right bank of river.
328¼	Battleford	18 July-10	1509.542	Reset 23rd. July-10.
328¼	"	23 July-10	1510.7	Approx. zero.
328¼	"	1 Aug.-10	1507.917	Gauge near Risdales.
328¼	"	1 Aug.-10	1507.894	Check 24th Sept.-10.
328¼	"	5 July-11	1508.977	Gauge near Risdale's. Carried out 6th. July-11.
328¼	"	13 July-11	1508.672	Gauge near Risdale's. Carried out 25th Aug.-11.
328¼	"	9 Sep.-11	1509.927	Gauge near Risdale's. Carried out 1st. June-12.
328¼	"	3 June-12	1506.877	Gauge near Risdale's. Carried out 21st. June-12.
328¼	"	11 July-12	1510.00	Gauge near Risdale's.
328¼	"	15 July-12	1507.492	Gauge near Risdale's.
328¼	"	14 May -13	1506.20	Gauge near Risdale's. Temporary.
328¼	"	16 May -13	1507.15	Gauge near Risdale's.
393	The Elbow (Ceepee)	31 May- 12	1442.924	Just above N.W. Abutment C.N.Ry.Bridge.
393	" "	31 May -12	1442.80	Just above N.W. Abutment C.N.Ry.Bridge. Check 22nd. Aug-12.
393	" "	31 May -12	1442.969	Just above N.W. Abutment C.N.Ry.Bridge. Check 6th. July-13.
393	" "	27 July-12	1445.77	Just above N.W. Abutment C.N.Ry.Bridge. Carried out by ice in Spring of 1913.
442½	Carleton Ferry	30 May -12	1403.544	100' below ferry. Left bank of River.
442½	" "	27 July-12	1406.30	100' below ferry. Left bank of River.
493	Prince Albert	22 June-10	1368.226	Gauge on 1st. pier from South Shore C.N.Ry.Bridge.
493	"	8 May-11?	1364.901	Gauge on 1st. pier from South Shore C.N.Ry.Bridge.
493½	"	26 Sep.-12	1365.94	14' gauge on Government Wharf.
493½	"	26 Sep.-12	1365.97	14' gauge on Government Wharf. Check 28th June-16.
493	"	17 Mar.-13	1364.00	24' gauge on 1st. pier South Shore C.N.Ry.Bridge.
493	"	17 Mar.-13	1363.97	24' gauge on 1st. pier South Shore C.N.Ry.Bridge. Check 28th June-16.
493½	"	18 Feb.-15	1369.0	Top of iron bar. Temporary. Winter gauge near Government Wharf.
531¼	The Forks	8 July-10	1238.611	In North Saskatchewan River 100 yds. above The Forks. Opposite B.M. 197.
531¼	"	12 July-11	1236.614	In North Saskatchewan River 100 yds. above The Forks. Opposite B.M. 197.
552	Fort a la Corne	24 July-11	1167.104	At Fort a la Corne landing, directly across river from B.M. 207. Carried away by driftwood 30th July-11.
552	"	24 Aug.-11	1168.084	
552	"	25 Aug.-14	1166.17	Gauge taken out 4th Nov.-14.
597	Nipawin Rapids	17 July-11		Not tied in. Carried away.
652¾	Foot of Tobin Rp.	26 Sep.-14	926.30	

MILEAGE	PLACE	DATE SET	ELEV. OF ZERO	REMARKS
670½	The "Cut Off"	20 July-11	889.817	
670½	" "	5 June-14	890.54	Tied in 6th Oct.-14.
725½	Pemmican Portage	28 Aug.-11	861.412	Opposite B.M. 272.
	Cumberland House	11 July-10	869.077	At entrance to Big Stone River.
	" "	16 July-14	866.61	Gauge at mouth of Big Stone River.
	" "	23 May -15	864.72	Gauge near Dredge.
800½	Le Pas	29 June-10	846.822	Gauge in Saskatchewan near Pas River.
800½	"	13 May-11?	845.452	Gauge on edge of wharf, near shore. Read in 1911-12-13.
800½	"	13 May-11?	845.182	Gauge on edge of wharf, near shore. Check 12th May-14.
800½	"	13 May-11?	845.157	Gauge on edge of wharf, near shore. Check 15th Oct.-14.
800½	"	14 Oct.-13	845.45	Gauge on edge of wharf, farther from shore than 1911 gauge. Same elevation.
800½	"	14 Oct.-13	845.072	Gauge on edge of wharf, farther from shore than 1911 gauge. Check 12th May-14.
800½	"	14 Oct.-13	845.037	Gauge on edge of wharf, farther from shore than 1911 gugge. Check 15th Oct.-14.
800½	"	15 Oct.-14	845.047	On end of wharf. Marked No. 2-1914.
800½	"	6 July-15	855.107	On south side of stone approach to new wharf.
875¾	Chemahawin	1913	831.38	Dept. of Interior metal enamelled gauge on H.B.Co's. wharf.
875¾	"	1913	831.43	Dept. of Interior metal enamelled gauge on H.B.Co's. wharf. Check 11th. June-15.
875¾	"	?	829.53	H.B.Co. wooden gauge on H.B.Co's. wharf.
914¾	Cedar Lake near The Narrows	1913	832.854	Dept. of Interior gauge.
922½	Cross Lake near foot of Demicharge Rps.	1913	816.7?	Dept. of Interior gauge.
934	Head of Grand Rapids	?	780.234	Dept. of Interior gauge.
939¾	Grand Rapids Settlement	1 July-10		On old Dominion Fish Co's. wharf. Not tied in.
939¾	" " "	1911		Locality No. 2. Not tied in.

NORTH SASKATCHEWAN RIVER SURVEY.

Discharge Measurements 1911

Table IX.

LOCALITY	DATE 1911	WIDTH of SEC.	AREA of SEC.	MEAN VEL-OCITY	GAUGE HGT.	DISCHARGE
		Feet	Sq. Feet	Ft. per Sec.	Feet	Second Ft.
Rocky Mountain Ho.- Clearwater River	June 5	194	762.75	1.79	1.90	1,367.69
Edmonton:-						
N. Saskatchewan R.	May 29	431	3083.52	2.18	6.43	6,710.27
" " "	" 30	431	3047.60	2.16	6.23	6,574.20
" " "	June 17	602	5415.72	3.78	10.60	20,456.65
" " "	Aug. 31	571	5041.45	3.11	9.80	15,697.26
Battleford:-						
N.Sask.R.-So. Chan.	June 20	506	4145.00	2.91	4.20	12,066.14
" " " No. "	" 23	1040	4203.70	2.33	4.15	9,787.51
" " " N.&.S."	" 23	1546	8348.70	2.60	5.18	21,853.65
" " " So. "	Sept. 7	489	3819.80	2.29	3.50	8,745.13
" " " No. "	" 7	1013	3621.35	2.48	3.60	8,975.01
" " " N.&.S."	" 7	1502	7441.15	2.38	3.55	17,720.14
Prince Albert:-						
N. Saskatchewan R.	July 6	859	7234.30	3.42	9.30	24,717.94
" " "	Sep. 15	834	5969.75	2.88	7.75	17,209.12
" " "	Oct. 3	786	4826.36	2.19	6.25	10,585.06
The Forks:-						
N. Saskatchewan R.	July 18	513	6425.35	4.25	9.40	27,315.11
" " "	Sep. 21	473	4843.95	2.62	5.60	12,705.09
S. " "	July 21	715	6649.55	3.89	7.90	25,920.73
" " "	Sep. 20	698	5780.20	3.46	5.70	20,004.77
Le Pas:-						
Saskatchewan River	Aug. 9	706	12246.90	3.48	10.35	42,637.35
" "	Sep. 29	671	7239.35	3.20	8.10	23,176.89
Carrot River	Aug. 7	290	3235.75	0.35	10.50	1,134.36
" "	Sep. 28	253	2239.10	3.20	8.25	1,192.43
Pas River	Aug. 5	153	1456.90	0.76	10.60	1,104.03
" "	Sep. 27	134	778.20	0.89	8.30	695.36
Saskatoon:-						
S. Saskatchewan R.	June 27	788	5286.58	4.09	7.00	21,633.67
" " "	Sep. 11	640	3354.81	3.04	3.00	10,198.47

Zero of Gauges for meterings in 1911.

Edmonton	1995.67	N.S.R.S. Datum
Battleford (North Channel)	1509.59	" "
" (South Channel)	1509.63	" "
Prince Albert	1364.90	" "
The Forks	1236.61	" "
Le Pas	845.45	" "
Saskatoon	Not determined	
Rocky Mountain House	3113.485	Alberta Central Railway Datum.

NORTH SASKATCHEWAN RIVER SURVEY.

Discharge Measurements 1912.

Table IX (Continued)

LOCALITY	DATE	WIDTH of SEC.	AREA of SEC.	MEAN VEL-OCITY	GAUGE HGT.	DISCHARGE
		Feet	Sq. Feet	Ft. per Sec.	Feet	Second Ft.
Rocky Mountain Ho.- N. Saskatchewan R.	June 14	379	1751.50	6.35	2.7	11,134.00
" " "	July 31	395	2087.90	6.82	2.55	14,252.47
Clearwater River	June 15	193	753.70	1.12	1.9	858.17
" "	July 29	195	956.25	2.79	2.3	2,627.45
¼ mile above mouth: Baptiste River	June 20	111.8	284.77	2.37	2.4	674.52
" "	Aug. 9	100	211.75	1.95	0.2	414.50
500' above mouth:- Nordegg River	June 26	98.4	214.34	1.66	2.8	356.27
" "	Aug. 13	99.7	247.18	1.74	1.0	431.83
Below Nordegg Riv.- Brazeau River	June 27	352.7	1595.24	3.30	2.8	5,350.15
" "	Aug. 13	355	1613.25	2.62	0.75	4,232.81
Above Nordegg Riv.- Brazeau River	June 28	328	1255.30	4.27	2.55	5,369.74
" "	Aug. 14	319	1079.35	3.79	0.5	4,135.02

NOTE:-

Gauges for 1912 Meterings were set from temporary Bench Marks, a list of which, with elevation, is given in Appendix

NORTH SASKATCHEWAN RIVER SURVEY.

Discharge Measurements - 1914.

Table IX (Continued)

LOCALITY AND STREAMS	DATE 1914	WIDTH of SEC.	AREA of SEC.	MEAN VEL-OCITY	GAUGE HGT.	DISCHARGE
		Feet	SQ.Ft.	Ft.per Sec.	Feet	SEcond Ft.
Rocky Mountain Ho.- Clearwater River	June 24	192	693.6	1.74	2.80	1,203.8
" "	Aug. 8	190	625.8	1.46	2.50	912.0
" "	Oct. 10	189	607.4	1.40	2.41	853.3
Saskatchewan River	June 25	437	1584.5	4.50	6.45	7,135.3
" "	Aug. 7	441	2001.4	5.41	7.58	10,811.6
" "	Oct. 9	433	1239.5	3.86	5.61	4,787.6
Mouth of Baptiste River	July 4	94	183.1	1.38	2964.5	255.8
" "	Aug. 1	79	110.3	0.62	2963.8	69.0
Mouth of Brazeau River	July 18	570	1091.4	2.58	2838.16	2,826.5
Above Nordegg R.- Brazeau River	July 24	263	605.5	4.34	2859.4	2,629.7
Below Nordegg R.- Brazeau River	July 25	352	1136.3	2.4	2858.08	2,730.1
Mouth of Nordegg River	July 22	86	142.2	1.01	2861.17	143.7
" "	" 27	86	119.4	0.99	2861.07	118.1
Mouth of Ram or Sheep R.	Aug. 24	92	130.0	3.41	87.71	443.7
" " " "	Oct. 6	90	107.4	2.74	87.44	294.6
At "The Gap" Saskatchewan River	Sep. 2	209	1038.6	5.31	196.65	5,516.3
" "	" 28	187	838.0	3.97	197.72	3,323.5
Above Siffleur R.- Saskatchewan River	Sep. 17	83	329.0	3.85	91.40	1,266.8
At Mouth Siffleur River	Sep. 16	56	72.8	1.84	94.30	134.3
At Mouth Cline or WhitegoatR	Sep. 14	74	109.3	3.65	95.80	398.7
" " " "	" 20	71	95.5	3.60	95.70	343.4
At Mouth Bighorn Creek	Sep. 7	32	18.3	2.12	91.89	38.6
" "	" 22	36	22.8	2.12	91.98	48.4

Continued on next page.

NORTH SASKATCHEWAN RIVER SURVEY.

Discharge Measurements -,1914. (Continued)

LOCALITY AND STREAMS	DATE 1914	WIDTH of SEC.	AREA of SEC.	MEAN VEL-OCITY	GAUGE HGT.	DISCHARGE
		Feet	Sq.Ft.	Ft.per Sec.		Second Ft.
At Mouth White Rabbit Creek	Sep. 18	21	9.6	0.95	94.61	9.1
At Mouth Mire Creek	Sep. 30	41.5	27.9	1.01	93.56	28.3

NOTE:

Gauges for 1914 Meterings were set from temporary Bench Marks, a list of which, with elevation, is given in Appendix

NORTH SASKATCHEWAN RIVER SURVEY.

Discharge Measurements - 1915.

Table IX (Continued)

LOCALITY AND STREAMS	DATE 1915	WIDTH of SEC.	AREA of SEC.	MEAN VEL-OCITY	GAUGE HGT.	DISCHARGE
		Feet	Sq.Ft.	Ft.per Sec.	Feet	Second Ft.
Baptiste River near mouth	July 13	124	219.6	3.16	2965.48	694.76
Brazeau River below mouth of Nordegg River	Sept. 2	347	1717.5	1.98	2858.70	3,331.21
Nordegg River near Mouth	Sept. 2	91	126.8	1.38	101.7 (from dam site levels)	175.24
Glacier Creek near Lake	Oct. 20	71	39.8	1.20	95.08 (Irrigat-ion B.M.)	48.02

NORTH SASKATCHEWAN RIVER SURVEY.

TABLE OF DISTANCES.

Note: Distances are measured on Centre Line of Proposed Channel.

Table X.

FROM	Miles To: EDMONTON (C.P.R. Bridge)	FORT SASKATCHEWAN	PAKAN	DUVERNAY-BROSSEAU	HEWITT'S LANDING	BATTLEFORD	CEEPEE (C.N.R. Bridge)	PRINCE ALBERT	THE FORKS	CUT OFF (Sturgeon River)	CUMBERLAND HOUSE	LE PAS	CHEMAHAWIN (Cedar Lake)	THE NARROWS	CROSS LAKE	GRAND RAPIDS (Head)	LAKE WINNIPEG
EDMONTON (C.P.R. Bridge)	0	25	76	124	219	328	393	493	531	671	726	801	876	915	923	934	941
FORT SASKATCHEWAN	25	0	51	99	194	303	368	468	506	646	701	776	851	890	898	909	916
PAKAN	76	51	0	48	143	252	317	417	455	595	650	725	800	839	847	858	865
DUVERNAY-BROSSEAU	124	99	48	0	95	204	269	369	407	547	602	677	752	791	799	810	817
HEWITT'S LANDING	219	194	143	95	0	109	174	274	312	452	507	582	657	696	704	715	722
BATTLEFORD	328	303	252	204	109	0	65	165	203	343	398	473	548	587	595	606	713
CEEPEE (C.N.R. Bridge)	393	368	317	269	174	65	0	100	138	278	333	408	483	522	530	541	548
PRINCE ALBERT	493	468	417	369	274	165	100	0	38	178	233	308	383	422	430	441	448
THE FORKS	531	506	455	407	312	203	138	38	0	140	195	270	345	384	392	403	410
CUT OFF (Sturgeon River)	671	646	595	547	452	343	278	178	140	0	55	130	205	244	252	263	270
CUMBERLAND HOUSE	726	701	650	602	507	398	333	233	195	55	0	75	150	189	197	208	215
LE PAS	801	776	725	677	582	473	408	308	270	130	75	0	75	114	122	133	140
CHEMAHAWIN (Cedar Lake)	876	851	800	752	657	548	483	383	345	205	150	75	0	39	47	58	65
THE NARROWS	915	890	839	791	696	587	522	422	384	244	189	114	39	0	8	19	26
CROSS LAKE	923	898	847	799	704	595	530	430	392	252	197	122	47	8	0	11	18
GRAND RAPIDS (Head)	934	909	858	810	715	606	541	441	403	263	208	133	58	19	11	0	7
LAKE WINNIPEG	941	916	865	817	722	613	548	448	410	270	215	140	65	26	18	7	0

LIST OF DATES ON WHICH THE NORTH SASKATCHEWAN RIVER AT PRINCE ALBERT OPENED AND CLOSED, FROM 1878 to 1916.

Table XI.

Year	River Opened	Year	River Opened	River Closed
1878	April 4th.	1899	April 26th.	December 1st.
1879	" 4th.	1900	" 12th.	November 10th.
1880	May 2nd.	1901	" 21st.	" 10th.
1881	April 22nd.	1902	" 18th.	" 9th.
1882	" 13th.	1903	" 25th.	" 16th.
1883	" 22nd.	1904	" 21st.	" 20th.
1884	" 24th.	1905	" 7th.	" 27th.
1885	" 10th.	1906	" 14th.	" 16th.
1886	" 16th.	1907	May 11th.	" 14th.
1887	" 25th.	1908	April 21st.	" 5th.
1888	" 30th.	1909	May 8th.	" 12th.
1889	" 13th.	1910	April 21st.	" 7th.
1890	" 29th.	1911	" 18th.	" 7th.
1891	" 20th.	1912	" 15th.	December 2nd.
1892	" 18th.	1913	" 15th.	November 15th.
1893	May 5th.	1914	" 19th.	" 16th.
1894	April 24th.	1915	" 9th.	" 12th.
1895	" 15th.	1916	" 10th.	December 2nd.
1896	" 28th.			
1897	" 17th.			
1898	" 24th.			

NOTE:- The River froze over below Bridge on November 13th, 1916, but remained open up at Island until December 2nd.

LIST OF FERRIES

ON THE NORTH SASKATCHEWAN RIVER BELOW EDMONTON. Table XII.

Miles From Edmonton	Name of Ferry	Location
0.3/8	Ferry	200 yds. below Walter's Mill, Edmonton, (abandoned).
(38)	Cookville Ferry	Sec.21-56-21-W.4th.
49½	River Creek (Lee Shore) Ferry	N.E.23-57-20-W.4th.
76.5/8	Pakan (Victoria) Ferry	R.L.6 Victoria Settlement, N.W.12-58-17-W.4th.
94.	Shandro Ferry	N.W.34-57-15-W.4th.
103.1/8	Desjarlais Ferry	S.E.11-57-14-W.4th.
124.3/8	Duvernay-Brosseau	Road allowance between Secs. 34 & 35-55-12-W.4th.
(147½)	North of Manville Ferry	Sec.18-55-8-W.4th.
158¼	Hopkins Ferry	N.W.15-56-7-W.4th.
(161½)	Elk Point Ferry	S.E.25-56-7-W.4th.
174.	Tyrol (Moose) Ferry	NE/SE-22-56-5-W.4th.
(182¾)	Heinsburg Ferry	N.E.21-55-4-W.4th.
194.5/8	Lea Park Ferry	S.W.14-54-3-W.4th. Vermilion River.
212¼	4th. Meridian Ferry	S.E.25-N.E.24-53-28-W.3rd.
218.7/8	Hewitt (Fort Pitt) Ferry	S.E.11-53-27-W.3rd.
247½	Lashburn Ferry	N.E.17-51-24-W.3rd.
230½	North Bend Ferry	Sec.20-53-25-W.3rd.
286.1/8	Paynton Ferry	S.W.6-48-20-N.E.36-47-21-W.3.
300.	Bresaylor Ferry	S.W.28-46-19-N.W.21-46-19-W.3.
305.5/8	Delmas Ferry	NE/SE-7-46-18-W.3rd.
356.1/8	Maymont Ferry	S.W.21-S.E.20-41-13-W.3rd.
370½	Fielding Ferry	Sec.7-40-11-W.3rd.(Installed 1915).
375.5/8	Radisson Ferry	NE/SW-26-39-11-W.3rd.
392½	Borden Ferry	S.W.30-N.W.19-39-8-W.3rd.
411.7/8	Hepburn Ferry	NW/NE-14-41-7-W.3rd.
420.5/8	Petrofka Ferry	N.E.30-N.W.29-42-6-W.3rd.
429.7/8	Laird (Tiefengrund) Ferry	SW/SE-31-43-5-W.3rd.
442½	Carlton Ferry	S.E.17-45-4-W-3rd.-H.B.Co. Reserve.
449.3/8	Wingard Ferry	S.W.7-46-3-W.3rd.
474½	Lily Plain Ferry	NW/NE-4-49-1-W.3rd.
494.3/8	East Prince Albert Ferry	City of Prince Albert (abandoned).
508.7/8	Cecil Ferry	N.W.22-49-24-W.2nd.
521½	Ferry (La Colle Falls)	N.W.30-49-22-W.2nd (abandoned)

LIST OF STEAMERS ON THE SASKATCHEWAN RIVER.

Table XIII.

"COMMISSIONER"	About 100 feet long, Stern-Wheeler, built by H.B.Co. at Grand Rapids. Wrecked at Demie Charge Rapids on her way up.
"LILLY"	About 100 feet long afterwards lined with oak. Built by H.B.Co. after the "Commissioner" sank. Ran for years to Edmonton till 1883 when she sank coming down the river below Medicine Hat.
"NORTHCOTE"	About 160 feet long. Built by the H.B.Co. at Grand Rapids about 1878. Ran until 1886 and then was pulled out at Cumberland.
"NORTHWEST"	About 200 feet long. Winnipeg and Western Transfer Co. bought from Peter McArthur. Brought out over Lake Winnipeg. Laid up at Edmonton about 1903. Was washed away by high water and thrown against the bridge. Boilers thrown out and wrecked.
"MANITOBA"	About 130 feet long. Brought out from Winnipeg about 1880. Sunk in Shell River, frozen to bottom in 1884.
"MARQUIS"	Two hundred and two feet long. Brought out from Winnipeg by Winnipeg and Western Transfer Co. Pulled out and laid up at Prince Albert in fall of 1886.
"BARONESS"	One hundred and thirty feet long. Belonged to the Galt Company. Made trip in the spring of 1885 from Medicine Hat to Prince Albert to Fort Pitt and to Grand Rapids, transporting troops. Was running for several years before this time.
"ALBERTA"	do do do do
"MINNOW"	Sixty feet long. do do
"KLONDYKE"	A tug, fifty feet long. Was built about 1892 at Prince Albert. Was used up and pulled out at The Pas in 1907.
"ASSINIBOINE"	Seventy feet long. Stern-wheeler. Owned by Capt. H. H. Ross. Built at Medicine Hat. Wrecked at Cedar Lake Sand Bar in 1905.
"SASKATCHEWAN"	One hundred feet long. Stern-wheeler, built at Prince Albert in 1904. Dismantled at The Pas in 1911 and machinery shipped to Peace River. Hull used by Ross Navigation Co. as barge. Sunk and destroyed at The Pas in 1917.

LIST OF STEAMERS ON THE SASKATCHEWAN RIVER (Continued)

"ALBERTA"	One hundred and thirty feet long. Sternwheeler built at Prince Albert in 1904. Taken to Winnipeg in 1904. Carried away by ice from Winnipeg in spring of 1915 and wrecked on Locks at Lockport on the Red River.
"MEDICINE HAT"	One hundred and thirty feet long. Sternwheeler built at Medicine Hat in 1906 and ran up South Branch for two years, then was wrecked at Saskatoon bridge in 1908. Owned by Capt. Ross.
"CUMBERLAND"	Eighty feet long. Twin screw, built at Prince Albert in 1904 and ran till 1908. Laid up at The Pas and dismantled in 1910. Owned by Northern Fish Company.
"JOHN BULL"	Fifty feet long. Built at Selkirk. Owned by Dominion Fish Co. Sunk in The Pas River in the spring of 1914 and wrecked by the ice.
"DESPATCH"	Forty-five feet long. Built in Selkirk. Owned by Dominion Fish Co. Brought up Lake Winnipeg to The Pas. Sunk in Moose Lake in 1907.
"OMEGA"	Seventy feet long. Built at Selkirk. Owned by Dominion Fish Co. Shipped to Prince Albert. Ran for two years in vicinity of The Pas. Sunk in Moose Creek. Dismantled at Moose Lake Creek in summer of 1917. Machinery shipped out from The Pas.
"EMMA E"	Forty-four feet long. Built at Collingwood and shipped to The Pas in 1908. Owned by The Finger Lumber Co. STILL OPERATING.
"SAM BRISBIN"	Forty-seven feet long. Built in Collingwood and shipped from Port Arthur to Selkirk. Brought up from Selkirk to The Pas, under steam via Lake Winnipeg and Saskatchewan River, in 1908. Owned by The Ross Navigation Co. Ltd. STILL OPERATING.
"THE PAS"	Thirty-five feet long. Built in Collingwood in 1910 and shipped to The Pas. Owned by The Ross Navigation Co. Sold and shipped to Nelson River in 1915.
"C. R. SMITH"	Eighty feet long. Side paddle wheel tow boat. Built at The Pas by The Finger Lumber Co. in 1911. STILL OPERATING.
"MINASIN"	Sixty feet long. Screw tug boat. Built at The Pas in 1912 for the Ross Navigation Co. STILL OPERATING.
"ARCHIBALD"	Fifty feet long. Screw tug boat. Shipped in from Fort Francis by Hudson's Bay Construction in 1913. Shipped to Edmonton in 1916.

LIST OF STEAMERS ON THE SASKATCHEWAN RIVER (Continued)

"NOTIN"	Fifty-two feet long. Screw tug boat. Built and shipped in from Winnipeg by The Ross Navigation Co. in 1913. Shipped to Lake Athapapuskow, 65 miles northwest of the Pas in 1916. Operating at that point.
"LE PAS"	Tug, 54 feet long, built at The Pas in 1914 by the Department of Public Works, Canada. Tender to Dredge "208".
"GEORGE V."	Built at Prince Albert, for The City of Prince Albert in 1911. Sold to F. E. Simmonds and taken to The Pas. Froze in river in 1915 and wrecked by the ice. Stern-wheeler.
"CITY OF EDMONTON"	Stern-wheeler 132 feet long, built in 1910 by the John Walter Co. Limited of Edmonton (Strathcona) - Used for passenger and freight service on Upper Saskatchewan. STILL OPERATING.
"STRATHCONA"	Stern-wheeler, 100 feet long. Owned by the John Walter Co. Limited. Used until 1915 for lumbering operations in Upper River. Pulled up at Strathcona.
"LAFLEUR"	Inspection Boat owned by the Department of Public Works, Canada. Stern-wheeler, 63 feet long. Built in Edmonton in 1911 for North Saskatchewan River Survey. Pulled up at Le Pas in 1915.
"NIPAWIN"	Built at The Pas in 1917 by The Ross Navigation Co. Stern-wheeler 110 feet long. STILL OPERATING.
"CITY OF PRINCE ALBERT"	Built at Prince Albert for the Prince Albert Lumber Co. in 1907. Stern-wheel tow boat. STILL OPERATING.
"COMET"	Built at Cumberland House in 1916. Thirty feet long. Twin screw tug. Owned by A. A. Deacon and J. Shannon. STILL OPERATING.

List revised to November 1917.

LIST OF GASOLINE BOATS

OWNED AND OPERATING AT THE PAS - 1917.

Table XIV.

NAME.	LENGTH.	OWNER.
"NONA. E."	35 ft.	The Indian Dept.
"ARTHUR. J."	60 ft.	Barney Anderson.
"..........."	35 ft.	Canada North Fish Co.
"..........."	35 ft.	Canada North Fish Co.
"MAPLE LEAF"	25 ft.	H. Carefoot.
"SHAMROCK"	30 ft.	T. H. P. Lamb.
"..........."	30 ft.	Finger Lumber Co. Ltd.
"..........."	25 ft.	Finger Lumber Co. Ltd.
"..........."	20 ft.	Finger Lumber Co. Ltd.
"PEARL. D."	22 ft.	C. B. Morgan.
"..........."	22 ft.	W. H. Bunting.
"..........."	25 ft.	The Armstrong Trading Co.
"..........."	20 ft.	The Armstrong Trading Co.
"..........."	25 ft.	Jack Bacon.
"YVETTE"	20 ft.	A. Taillon.

NOTE:- In connection with these lists there are some 14 scows or lighters operating out of The Pas with a carrying capacity of over 1000 tons, net weight.

Outside of the Gasoline Boats mentioned above, there are five steamers operating from The Pas with The Pas as headquarters.

S T A F F

The following is a List of the Names of Members of the North Saskatchewan River Survey Staff with dates of employment.

Table XV.

NAME	CAPACITY	WHEN EMPLOYED.
Adam, W.	Rodman	Apr. 24-Oct. 17, 1914.
	Ass't. Draughtsman	Oct. 18, 1914-Jan. 31, 1915.
Audet, P.	Chainman	June 13-Sept. 7, 1910.
Baker, C.	Chainman	June 7-Oct. 9, 1915.
Beaudry, G.	Rodman	June 6-Oct. 21, 1910.
	"	May 7-Sept. 16, 1911.
	"	May 11-Aug. 25, 1912.
Bell, C.	Rodman	Sept. 1-Oct. 17, 1914.
Brittain, J.	Transitman	June 25-Sept. 18, 1910.
Cagnat, G.H.	Hydraulic Engineer	May 15-Sept. 30, 1912.
Chalifour, S.J.	Rodman	May 11-Aug. 26, 1912.
Chapman, G.H.	Draughtsman	Oct. 22, 1912-Nov. 15, 1916.
Chenevert, R.	Rodman	June 11 - 1910.
Cimon, H.	Recorder	June 20-Sept. 6, 1912.
Clarke, V.C.	Rodman	May 1-Oct. 17, 1914.
Cloran, J. H. D.	Leveller	June 9-Oct. 22, 1910.
Cloran, E. P.	Rodman	May 17-Sept. 16, 1911.
Code, G. H.	Picketman	June 5-Sept. 17, 1914.
Collins, W. S.	Rodman	May 11-Oct. 10, 1913.
Colt, S.P.	Draughtsman	Nov. 3-Dec. 31, 1913.
Cook, S.C.	Rodman	May 13-Aug. 14, 1912.
	"	May 11-Aug. 20, 1913.
Cote, A.	Chainman	Aug. 18-Oct. 9, 1915.
Cote, J. A.	Transitman	June 11-Oct. 9, 1915.
Cote, J. C.	Picketman	May 4-Oct. 17, 1914.

NAME	CAPACITY	WHEN EMPLOYED
Cross, W.	Hydraulic Engineer	May 15-Oct.25,1911.
Dansereau, J.A.	Rodman	June 23-Aug.30,1910.
Davidson, G.H.	Recorder	May 13-Aug.26,1912.
DesRosiers, A.R.	Transitman	May 11-Aug.22,1912.
DesRosiers, J.	Transitman	June 1-Sept.20,1910.
	"	May 13-Sept.16,1911.
Dessaint, J.C.	Recorder	July 1-Sept.19,1913.
Dixon, G.B.	Rodman	June 15-Oct.22,1910.
	Recorder	May 23-Aug.26,1911.
Evans, V.H.	Chainman	May 11-Aug.17,1913.
Farthing, L.G.	Ass't. Draughtsman	June 1-Sept.30,1913.
Fraser, A.J.	Rodman	June 6-Sept.15,1910.
	"	May 17-Sept.16,1911.
Glasmacher, W.A.	Leveller	June 6-Sept.30,1910.
Graham, F.J.	Rodman	June 13-Oct.6, 1910.
Green, T.D.	Ass't. Engineer	June 25-Sept.30,1913.
Hebden, H.E.	Transitman	June 7-Oct.9,1915.
Hebert, R.	Chainman	June 9-Sept.7,1910.
Hinett, S.	Rodman	June 7-Aug.19,1915.
Holmgren, E.L.	Chainman	May 11-Aug.17,1913.
Johnston, B.A.	Rodman	May 1-Oct.17,1914.
Kerr, S.C.	Rodman	June 13-Sept.15,1910.
Kerrigan, H.G.	Gauge Inspector	July 1-Oct.1,1910.
Kingston, K.J.	Rodman	June 13-Sept.20,1910.
Kirkpatrick, A.M.	Hydraulic Engineer	June 1-Nov.11, 1914.
	" "	June 7-Dec.19, 1915.
Labrecque, H.	Chainman	June 6-Sept.15,1910.
	Recorder	May 29-Aug.31, 1911.
Lafortune, J.A.	Foreman	Apr. 1-Sept.16,1911.
Laframboise, A.	Picketman	June 20-Sept.7,1910.

NAME	CAPACITY	WHEN EMPLOYED.
Laird, A.	Rodman	May 1-Oct.17,1914.
Lalonde, A.	Rodman	May 1-Oct.17,1914.
Lamothe, G.	Rodman	May 27-Aug.26,1912.
Maconechy, W.	Leveller	Sept. 1-Oct.17,1914.
Markham, E.	Transitman	May 1-Oct.17,1914.
Mawhinney, W.B.	Rodman	May 11-Aug.17,1913.
McLean, H.D.	Rodman	May 1-Oct.17,1914.
Moir, R.E.S.	Chainman	May 1-Oct.17,1914.
Morse, G.P.	Leveller	June 4-Oct.8,1910.
	Ass't. Engineer	Oct. 9,1910.-
Moyser, W.	Chainman	May 8-Oct.17,1914.
Pennock, W.D.	Recorder	May 3-Aug.20,1913.
	Transitman	May 6-Aug.15,1914.
Pitt, C. McL.	Rodman	May 11-Aug.26,1912.
Rennie, W.L.	Leveller	June 7-Oct.9,1915.
Ross, J.C.	Leveller	June 21-Oct.21,1910.
	"	May 15-Sept.16,1911.
	Transitman	May 19-Aug.23,1912.
	"	May 8-Oct.10, 1913.
	"	May 1-Oct.18, 1914.
	Rodman	Aug.18-Oct.10,1915.
Roy, de B.	Chainman	June 6-Sept.20,1910.
Ryan, J.A.	Recorder	Sept.2-Oct.10,1911.
Rye, W.	Picketman	June 7-Oct.9, 1915.
Smith, P.H.	Leveller	July 1-Oct.8, 1910.
	Ass't. Engineer	Oct. 9, 1910 -
Smith, S.H.	Rodman	June 1-Sept.27,1911.
Steward, D.V.	Rodman	June 7-Oct.9,1915.
St. Laurent, A.	Rodman	June 21-Aug.31,1911.
	"	May 20-Sept.12,1913.
	Recorder	June 20-Nov.11,1914.
	"	June 7-Dec.19,1915.

NAME	CAPACITY	WHEN EMPLOYED
Thibault, L.A.	Picketman	May 11-July 31,1912.
Turner, M.H.	Chainman	June 7-Aug.19,1915.
Twiss, R.D.	Recorder	June 11-Sept.27,1911.
	Ass't. Draughtsman	Nov.27,1911-Apr.30,1912.
	" "	Sept.1,1912-Apr.30,1913.
	" "	Nov. 1,1913-Apr.30,1914.
	" "	Nov. 1,1914-Mar.31,1915.
	Leveller	May 1 - Aug.31,1912.
	"	May 1 - Oct.31,1913.
	Transitman	May 1 - Oct.31,1914.
Urie, H.R.	Transitman	May 11-Oct.10,1913.
Voligny, R.Jr.	Rodman	June 21-Aug.31,1911.
	"	May 11-Aug.26,1912.
	"	June 1-Aug.20,1913.
	Recorder	Apr.24-Sept.1,1914.
	"	June 1-Sept.30,1915.
	Ass't. Draughtsman	Oct.1,1915-Mar.31,1916.
Weeks, R.E.	Picketman	May 11-Aug.17,1913.
Whitman, C.B.	Rodman	May 11-Sept.20,1913.

APPENDIX "F"

HISTORICAL

APPENDIX "F"

HISTORICAL

The following is reproduced from Mr. A. H. de Tremaudan's Book "The Hudson Bay Road" (J. M. Dent & Sons, Limited, London and Toronto, 1915):-

THE SASKATCHEWAN RIVER.

At Winnipeg, on July 12, 1910, the Honourable Mr. Pugsley, Minister of Public Works in the Federal Government, who was accompanying Sir Wilfrid Laurier in his western tour, was the first public man to refer to an important though purely western transportation problem intimately connected with the Hudson Bay Railway. He said: "Nature has provided right at your doors a great river running down into Lake Winnipeg, a lake that is greater than Lake Ontario. The River Saskatchewan rises some 1,300 miles to the westward, in the foothills of the Rockies. I am one of those who believe that with a reasonable expenditure of money, it will be possible to create a great system of inland navigation extending from the city of Edmonton and beyond, right down for 1,300 miles to this great city." #

Two days later, at the opening of the St. Andrews locks, on the Red River, connecting Winnipeg with the lake, Sir Wilfrid had the following to say on the subject: "We have opened the Red River up to Lake Winnipeg and it now remains for my friend Dr. Pugsley to open the Saskatchewan River from Edmonton to Winnipeg. I am glad to say that my friend, the Minister of Public Works, is already at this work. He has

---

"I have the greatest possible confidence that in the immediate future a great traffic will be developed on the Saskatchewan River between Edmonton and the Pas, on the line of the Hudson Bay Railway leading to the Nelson River."-Hon. Robert Rogers, Minister of Public Works, at Edmonton, September 1913.

engineers in the field surveying the Saskatchewan River, and before many years are over I hold that we shall witness such a thing as has been witnessed to-day - that is to say, the opening to navigation of the Saskatchewan River up to the city of Winnipeg; and if God spares me, and if the Grace of God and the will of the people keep me where I am, I am sure that I shall see the day when a barge laden with coal at Edmonton, nay, at the very foot of the Rocky Mountains, will be unloaded at Winnipeg without breaking bulk on the way."

These two utterances were no doubt in answer to the resolution passed by the Associated Boards of Trade of Western Canada, a month earlier, "urging the improvement of navigation of the Saskatchewan River."

In 1895 Mr. John Ross, who built the north shore line of the Canadian Pacific Railway, had written: "When the population of these territories comes to be counted by millions and tens of millions, as in course of time it will be, all the railroads likely to be built would not suffice to carry their surplus productions to the ocean, at least at such rates as would be satisfactory to agricultural communities. But through these wide regions Nature has provided a highway for cheap transportation, which can, at an outlay which the government might well bear, be rendered available."

With the advent of the railway, and the settling of the southern portions of the western provinces, what had been the principal highway of the traders and explorers since Laverendrye's sons had discovered it in 1741, the River Saskatchewan, had been more or less forgotten. Only the Indians with their birch-bark canoes and the Hudson's Bay Company with its York boats, steam vessels, and barges had continued to navigate its waters, from Edmonton on the North Branch and Medicine Hat on the South Branch to Grand Rapids on Lake Winnipeg. As soon as the Hudson Bay Railway became a possibility of the near future, it appeared evident that

this immense waterway of the old trading days should again be utilized, this time in transporting the grain of the western plains to the Pas, the south terminus of the new projected railway.

The Peace River country was just commencing to attract the attention of the settler, offering the same advantages for colonization that Manitoba and the south portions of Saskatchewan and Alberta had offered since the opening of the country by the Canadian Pacific Railway. On account of the remoteness of the district from the eastern markets and the consequent high cost of transportation, it seemed reasonable to expect that the settler would be encouraged in the task of opening these last immense plains by an effort to give him a means of transportation with the help of which he could compete successfully against the excessive charges which would necessarily be made by the railways entering the new territory.

As early as 1858 the government of Canada, which was already looking with envy at the North-West Territory of those days over which the Hudson's Bay Company held sway, had sent an expedition to, among other objects, survey the River Saskatchewan with a view to study its navigability. Dr. Henry Youle Hind, M.A., professor of chemistry and geology in the University of Trinity College, Toronto, had been placed in charge. His report, published the following year, is one of the most extensive works on the subject, and, to this day, remains an authoritative record. The exploration, however, did not extend to the North Branch of the river, which, from all precedent reports handed down from the days of Henry and Thompson, had proved, beyond doubt, to be the more navigable of the two branches.

Hind thus describes the South Branch and the main river:

"The south branch of the Saskatchewan is a noble river, varying in width from half a mile to three hundred yards, for a distance of 100 miles from the Elbow; it then gradually

contracts its channel and changes its character from a river full of sand-bars and mud-flats, pursuing a comparatively straight course, to a rapid and uniform torrent of water, sweeping down the narrow but deep valley it has excavated, from one bank to the other in magnificent curves, until it joins the North Branch . . . . The main Saskatchewan is a river of very imposing magnitude. Like the South Branch, it occupies a narrow, deep valley, varying in width from 1½ to 3 miles, extending a few miles below the Nepoween Mission. It flows in grand curves from side to side, and its general level is about 300 feet below the country through which it has excavated its channel, after which it enters the low region."

"About 158 miles below Fort a la Corne, near Tearing River, the main Saskatchewan is 330 yards broad, 92 feet deep in the channel, has a mean sectional depth of 20 feet, and flows at the rate of 2 miles an hour. 291 miles below the Grand Forks the main Saskatchewan enters Cedar Lake, 30 miles long. Issuing from this large body of water, it expands into a small lake, but soon again contracting its channel, the Cross Lake Rapids come into view; these rapids have a fall of 5¾ feet. Hudson's Bay Company's boats of 4 or 5 tons are tracked up them with half cargo, but loaded boats descending run the rapids. The length of the portage involved in ascending the river is 230 yards. The Saskatchewan now enters Cross Lake, and after issuing from this elongated expanse of water, begins a rapid course to Lake Winnipeg, with a current often 3 and sometimes 3½ miles an hour. The head of the Grand Rapids is about 4 miles from the mouth of the river. The length of the portage is 1 mile 7 chains. The rapids below the portage are about 1½ miles long, so that the total length of the Grand Rapids exceeds 2½ miles. The fall from the west to the east end of the portage, as ascertained by levelling, is 28½ feet. The fall below the portage is estimated to be 15 feet, consequently the total fall is about 43 feet."

In the course of his report, the author, in connection with the discoveries of gold in British Columbia, shows how, until the construction of a railway, the great Saskatchewan River seems to be the natural highway between the valley of the Mississippi on one hand, and the St. Lawrence Valley by way of Lake Superior on the other, with the province of the Pacific slope of the Rocky Mountains. Already parties of American emigrants coming from St. Paul had been met, which were proceeding to Frazer's River via the North Branch, instead of by the Missouri route, which was considered more hazardous. A company, calling itself the Canadian North-West Transportation Company, was proposing to put in a line of steamboats between the Red River as far as St. Paul and the North Saskatchewan, with a possible connection with Lake Superior by the Lake of the Woods. "In these projects, so rapidly approaching completion, the North Branch of the Saskatchewan is the route to be followed to British Columbia. In a word, public attention seems to be almost exclusively directed to Lake Winnipeg and the North Branch."

As to the South Branch, the diversion of its waters down the Qu'Appelle Valley would make a communication for steamers possible from Fort Garry to near the foot of the Rocky Mountains, by way of the Assiniboine River: for this, a dam 85 feet high and 600 to 800 yards long across the South Branch, below the point of its junction with the Qu'Appelle River would easily be protected from any possible resulting flood by means of a shallow cut through the gentle rise separating the Assiniboine from the Rat Rivulet, which would permit the excess waters to flow into Lake Manitoba.

While the project of the South Branch via the Assiniboine and Qu'Appelle Rivers has since been abandoned, the other has been mentioned from time to time, principally during the last few years. The main difficulties are the Grand Rapids, at

the point where the main river flows into Lake Winnipeg, and where a canal with locks has to be built, and the Coal Falls on the North Branch, just above the Grand Forks, where 18 miles of rapids obstructed by boulders, many of which are exposed during low summer levels, create serious engineering problems. These, however, may be in part solved after the construction of the big power dam being presently erected by the city of Prince Albert at that point. ....

......The importance of the navigation of the two Saskatchewans in connection with the Hudson Bay Railway will be readily seen. Water routes being recognized to be so much cheaper than railways, barges laden with wheat may be floated down these two rivers, at an immense saving, to the Pas, there to be unloaded into the Hudson Bay trains for the last 424 miles of the inland route.

The immense possibilities of the project have made a writer, in one of the numbers of the CANADIAN MAGAZINE, in 1911, exclaim with considerable appropriateness and foresight: "The future of the Saskatchewan is assured. To-day the Peace River country is on the eve of its development; to-morrow, as a new province, it will be sending its wheat to European markets by the cheapest and shortest route. And what is that route? Beyond all doubt, it is by way of the Saskatchewan River and Hudson's Bay. The expenditure of a few million dollars would make the river safely navigable as far as the Pas, where waiting trains would whisk the golden grain to the hold of transatlantic steamships. This is not a dream, but a prophecy. Railways may scoff, but the fact must soon be faced; the Saskatchewan is again coming into its own."

In the expectation of the traffic which should take place in this connection at the Pas, the Federal Government is now spending several thousand dollars in dredge work and on a wharf. What has been to this date the most important

inland port between Winnipeg and the Rockies thus sees another impetus given to its already advantageous geographical position.

With time and the spending of several more million dollars it may be reasonably expected that the navigation of the Saskatchewan River, in relation to the Hudson Bay route, shall not stop at the Pas; but that it shall be continued past the Grand Rapids northward on Lake Winnipeg to Norway House and down the Nelson River, provided with a system of canals around its numerous rapids on the 200 odd miles where it is not now navigable, on to Port Nelson. The dream of Sir Wilfrid Laurier, in which he saw an immense waterway from the foot of the Rocky Mountains to Winnipeg, forsooth to Quebec via the Lake of the Woods and the Great Lakes, will then not only be realized but exceeded to the extent of making several western cities seaports in miniature, in which the products of the farms may be loaded in barges which will only be transhipped to the transatlantic vessels at the terminals of the Hudson Bay route. Imagination may even go one better and picture to itself the ironclad monsters steaming along the different rivers of the Nelson basin, far inland, for or with their cargoes. In the meantime, on March 5, 1912, an organization called the "Red River to the Hudson Bay Navigation Association," with Mr. R. D. Waugh, then Mayor of Winnipeg, as president, was formed at Grand Forks, in North Dakota, for the purpose of advocating the creation of an all-water route to Hudson Bay: which may serve to demonstrate that the scheme is not all dream for some enthusiastic westerners.#

It may be safely said, however, that many generations will pass before the immense difficulties along the Nelson River will be surmounted. Indeed, what is required, except possibly for the 60 miles between Cross Lake and Manitou Rapids, is a continuous canal. Even that will be found hardly sufficient on account of the rapid drop towards Hudson Bay. As an example, it may be stated that reliable engineers in the employ of the Hudson Bay Railway have figured on the necessity of providing no less than twenty-seven locks to go through Gull Lake alone,

"With the advent of the iron horse the west went railroad mad," some one has said very pointedly. This madness will pass away and the rivers will again have their days of usefulness as the most natural highways of commerce.

---

a mere expanse of the Nelson River. As one of them puts it: "A season would not be sufficient to carry a boat from Port Nelson to Lake Winnipeg." Of course, it is difficult to picture to one's mind the millions which would have to be spent to build this gigantic canal from lake to bay. The possibility of a continuous navigation from Port Nelson seems to be wholly of the domain of conjecture and utopia.

FROM MANITOBA FREE PRESS.

"THE" or "LE" - WHICH?

The following communication has reached the FREE PRESS in regard to the name of the new town which is the centre of the lately acquired extension of the territory of Manitoba:

"Having noticed lately that some despatches from the southern terminus of the Hudson Bay Railway were headed The Pas (pronounced Paw), the reappearance of this hybrid name has set me wondering why this form, which I thought had been finally abandoned, should again find people willing to employ it. I have taken the trouble of studying most fully documents, historical and traditional, bearing on the subject, and I now take the liberty of asking you, Mr. Editor, to kindly open the columns of your valuable journal to the few facts and remarks which I have gathered on the subject, as well as the only natural conclusion which, in my opinion, can be reasonably arrived at.

"When, last January, the inhabitants of the new northern metropolis, Le Pas, were asked to vote on a money by-law providing for the expenditure of $120,000 on sewers and waterworks, there was not one single vote registered against the proposition. This established a new record in such matters in Western Canada, and showed how well united the people of that town are. There is only one point, apparently, on which opinions differ, and which causes a little friction between the two camps in which the population is on this account divided. That is whether "Le Pas" or "The Pas" should be the name of the south terminus of the Hudson Bay Railway.

"In view of the considerable attention which this town has attracted for the past eighteen months, a short and impartial study of the subject should not be amiss.

"As far as modern history goes, Le Pas dates back to 1840. In that year, Rev. Henry Budd, an Indian catechist from York Factory, founded there a Church of England mission, which was known successively as Devon Mission, Cumberland Mission and Pas Mission. On his arrival he had found the place called "Le Pas de la Riviere" and evidently found it ultimately necessary to preserve this name, although with the help of the Hudson's Bay Company it was Anglicized into the form The Pas. The tombstone of the Indian preacher is still to be seen in the old cemetery by Christ Church, at the northern end of Fischer Avenue. The inscription on it reads as follows: "Sacred to the memory of the Rev. Henry Budd, who died April 2, 1875, aged 61 years. Named after one of the founders of the C.M.S. The first Indian convert and clergyman in Rupert's Land. An earnest and faithful minister of the gospel for 25 years. Beloved by the flock over which he was pastor."

"From that time to about 1895, the place continued to be known as The Pas and Pas Mission among the English-speaking element of the population, and Le Pas among the French-speaking people. In that year a post-office was established to which the name The Pas was given.

"In 1908, the Canadian Northern Railway named its station Le Pas, and in 1911 the post-office department followed suit and changed the name from The Pas into Le Pas. The same fall the local newspaper, the HUDSON'S BAY HERALD, was established, which naturally adopted the name used by both the railway and the post-office department. In the spring of 1912, a deputation went down to Winnipeg to obtain the incorporation of the town under the name of The Pas, which was granted, although the new electoral district formed of Manitoba's new territory had been previously called Le Pas. Those who are in favour of the French form say that in doing this the members of the deputation overrode their instructions, as the mandate they had received

did not authorize them to unnecessarily change established conditions.

"Two etymologies are offered as to the work "Pas". Those who are in favour of the form "The Pas" say that it is a contraction of the Indian work 'opasquiaow', which, they explain, means 'water converging to a narrows, with high land and spruce trees on either side.' Those who stand for "Le Pas" rejoin that, if it be so, it should be pronounced 'The Pass', since in the Indian word the 's' is sounded, and they offer the counter explanation that 'pas' is a French word which means 'narrow passage', as employed in the well-known geographical terms, Pas de Calais, Pas de Roland, Pas du Loup, etc. In fact, the Indian and French meanings do not differ materially, both are perfectly descriptive of the aspect which is characteristic of the Saskatchewan River at Mission Island, where the Hudson Bay Railway bridge has been erected. It must be admitted, at any rate, that if the work 'pas' is a contraction of the Indian word 'opasquiaow', it is at least pronounced after the French fashion. In English, even if understood in the sense of dance step, as used by Chaucer, the correct pronunciation should be 'pass.'

"But the history of that place goes much further back than 1840, and it is there that the French etymologist finds his most weighty material. I believe that your readers will find the facts that I am going to rapidly enumerate, interesting and given in an impartial manner, although, favouring the French form and believing that it is better known by the public at large than the English form I shall continue to use Le Pas in my narrative.

"To Chevalier Pierre and his brother Francois, sons of the now famous western discoverer, Pierre Gaultier de Varennes, Sieur de la Verendrye, is generally ascribed the honour of having discovered the Saskatchewan River, which they ascended

as far as the forks in the fall of 1741. Before them Henry Kellsey had taken a trip south-west of Port Nelson as early as 1691, but it is not probable that he went as far south as the Saskatchewan River, and in 1739, a French half-breed by the name of Joseph La France, a native of Michili Makinak, on Lake Huron, had set out for Hudson Bay, and finally spent the winter of 1740-41 near Le Pas, on Saskaram Lake. It seems, however, impossible to verify the stories of Robson and Dobbs, and for this reason most historians do not mention them.

"Leaving their father at Fort de la Reine (Portage la Prairie), the two younger la Verendryes had started northward, discovering Lake Manitoba, on the west side of which they had founded Fort Dauphin, subsequently reached the Saskatchewan River, established Fort Bourbon on the west end of Cedar Lake and Fort Poskoiac, where Le Pas is to-day.

"According to most reliable historians such as Rev. E. Petitot, laureate of the Geographical Society of London, and Rev. A. G. Morice, member of the Historical and Scientific Society of Manitoba and British Columbia, and who is admitted an authority on western history by Catholics and Protestants alike, the two younger la Verendryes named that part of the Saskatchewan River flowing between the junction point of the north and south branches above Fort a la Corne and Le Pas, Riviere du Pas, out of devotion to their mother, Marie Anne Dandonneau du Sable de l'Isle du Pas, daughter of the marquis of that name. In support of this version, Rev. E. Petitot states that during his trip up the river in 1862, on arriving at Le Pas, his French half-breed guides exclaimed on sighting the wide expanse of the Saskatchewan River: 'La Riviere du Pas!' 'And the Saskatchewan?' 'There is no river of that name. This is the Riviere du Pas; we know of no other.' This opinion is confirmed by John M'Lean, who in his notes of a 25 years' service in the Hudson Bay territory, published in 1849, wrote:

'We arrived on the 5th of August (1833) at Riviere du Pas, where an old Canadian, M. Constant, had fixed his abode, who appeared to have an abundance of the necessaries of life, and a large family of half-Indians, who seemed to claim him as their sire.'

"Dr. Bryce says that la Verendrye's sons shortened the name of the river, which was 'Paskoyac', to 'Pas'. James Settee, a minister of the gospel at Cumberland House, says that the French-Canadian half-breeds called the Saskatchewan River 'Riviere du Pas'. He has lived in the country for years, and before him his father and mother lived in it.

"In my opinion, however, it seems strange that if this name were given to the Saskatchewan River by the two younger la Verendryes, it should not be mentioned on the map which was on their return prepared by their father, and on which it seems evident that the Saskatchewan River from Le Pas is named Baskoia. On the other hand the map may have been prepared in the absence of the two young men, and on their data, while they were away on further discoveries. This would not have prevented the name 'Riviere du Pas' being preserved among the French half-breeds, who had heard it employed by the two la Verendryes and the men in their party.

"In 1763, when Canada was ceded to England by the Treaty of Paris, of the French traders and missionaries who had accompanied or followed the la Verendryes on their trip up the Saskatchewan, there were hardly any left, they having returned to Quebec to take part in the fight which culminated in England getting possession of almost half a continent. The result was that the French language almost disappeared from the land, being retained only by the Metis and some of their Indian allies. Later, however, about 1783, the Scotch merchants who had commenced hieing away to the Far West as early as 1760 again employed the 'Coureurs des Bois' and 'Voyageurs' in their

expeditions, and as all their men spoke French among themselves, the French expressions as well as names of places were retained, for some time, at least. In some cases, however, they were unable to account for the meaning of some of them, and so Riviere du Pas degenerated into Le Pas de la Riviere, these men, no doubt, imagining that the name had been given on account of the narrow passage at Mission Island.

"No one will try to deny that French was very much in use among the Scotch merchants, who, as soon as they were able to get them, used none but French-speaking employees, on account of their being better adapted, by years of residence in the country and contact with its Indian population, to the hardships of the fur trade. This is evidenced by the terms used even in the reports of these merchants. M'Tavish, of X. Y. Company, in 1779, was nicknamed 'Le Premier' or 'Le Marquis', while such appellations as 'Les Petits', 'La Petite Compagnie', 'Pot au Beurre', 'Cantine Salope', 'Mangeurs de Lard', 'Le Rouge', 'Le Blanc', 'Le Borgne', 'Le Picote', 'Les Vachers', etc., were quite common.

"It would, therefore, be quite unreasonable to deny that Le Pas is undoubtedly much older than the hybrid form, The Pas.

"Another feature favouring the form Le Pas is the fact that about 1800 a French-Canadian and native of Three Rivers, named Constant, settled on the point where the town is now located, cleared the ground of the trees that were there, and started farming. According to his grandson, Antoine Constant, the present chief of the Indians of the Pas reserve, from whose lips this information has been obtained, Constant married a a Sauteaux woman, who gave him two boys and four daughters. The present chief's father, whose name was also Antoine, married a Cree woman, who bore him five boys and four daughters. Now, to any unprejudiced person, the question is asked: Is it likely that the first Constant, who was probably one of these coureurs des bois or voyageurs, above mentioned, would

have called Le Pas anything but Le Pas? Is it reasonable to imagine that he may have called it The Pas?

"The remark has been made that The Pas has been in use by the government on its maps and in its reports, principally those emanating from the Indian Department. This is not denied, but the same may be said of Le Pas. For example, Le Pas is to be seen on the official plan of township 56, range 26, W. 1st M. In his booklet, THE HUDSON BAY ROUTE, published in 1908 by direction of the Department of the Interior, J. A. M'Kenna uses the form Le Pas. In the 1912 report of Indian Inspector Jackson and Indian Agent Fischer, Le Pas can be read. As a matter of fact, both terms have been employed, chiefly recently.

"The object of this article is to give the facts just as they are found and without partiality. In conclusion, the writer might be permitted to make the following remark: We British should be satisfied with having conquered this part of the world. In this, imitating our cousins of the United States, we should be willing to let the places which remind one of the early history of the country retain the names which are so characteristic of its early settlement by the European nations, and not grudge to a nation with whose people we are now allied the satisfaction of bringing back some of its ancient history, when this satisfaction does not extend beyond the naming of a place. Let us be generous, and so long as tradition does not conflict with common sense, let us permit the right to our French co-citizens to retain even so little a share in the building up of our great western country. They have been at the battle: why refuse them their place at the triumph? The victor is worthy of the spoils.- Yours truly,

"FAIR PLAY"

"Winnipeg, May 15, 1913."

REPORT

OF THE

SURVEY OF THE NORTH SASKATCHEWAN RIVER FROM EDMONTON TO LAKE WINNIPEG

1910 - 15

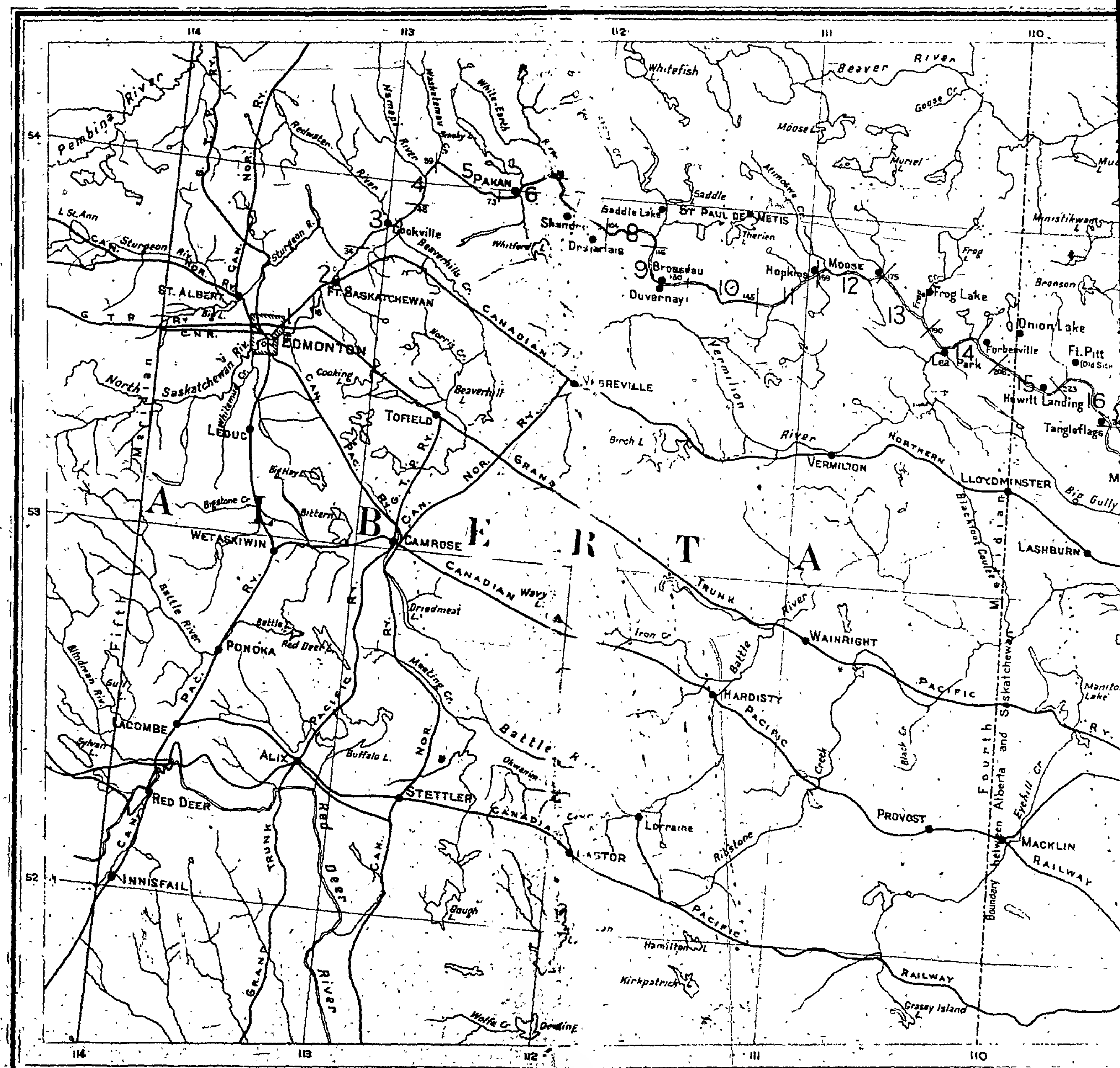
BY

L. R. VOLIGNY, C. E.

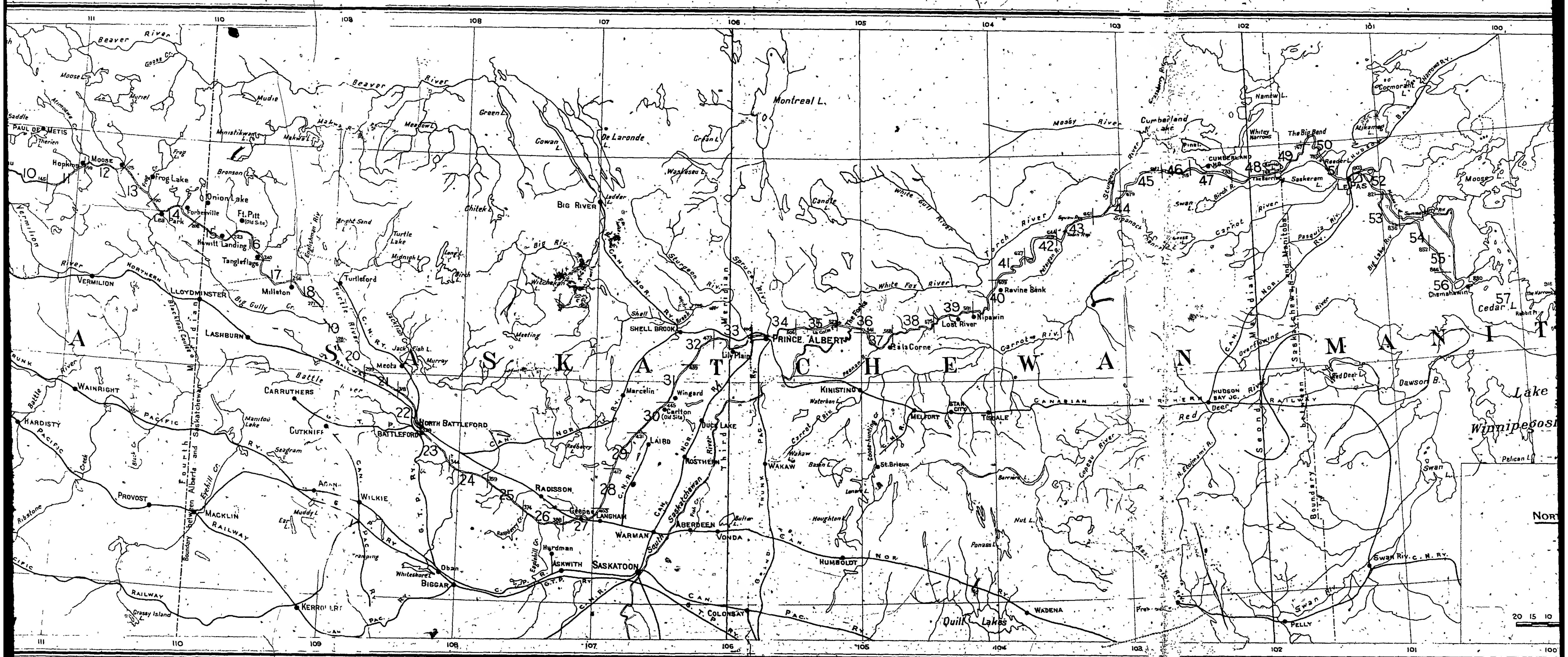
VOLUME 3 OF 3

C H A R T S

108



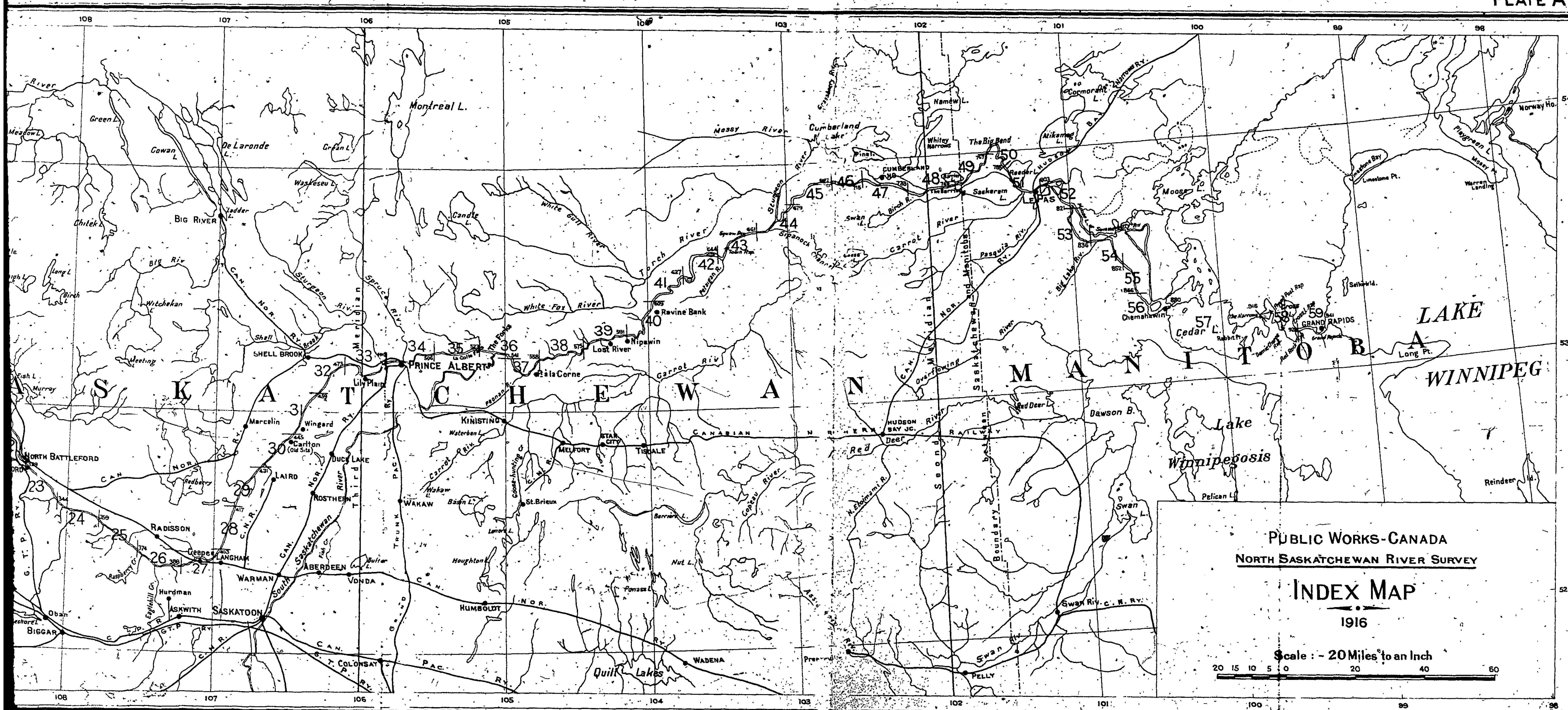
ALBERTA
EDMONTON
ST. ALBERT
FT. SASKATCHEWAN
Lookville
PAKAN
Shandro
Brosseau
Duvernay
Hopkins
MOOSE
Frog Lake
Onion Lake
Ft. Pitt
Lea Park
Forbesville
Hewitt Landing
Tangleflags
ST PAUL DE METIS
Saddle Lake
Therien
Whitefish L.
Beaver River
Moose L.
Muriel L.
Goose Cr.
Frog L.
Bronson L.
VEGREVILLE
TOFIELD
Beaverhill L.
Cooking L.
LEDUC
Birch L.
Vermilion River
VERMILION
LLOYDMINSTER
LASHBURN
Big Gully
WETASKIWIN
CAMROSE
Bittern L.
Driedmeat L.
Wavy L.
PONOKA
Battle L.
Red Deer L.
Battle River
WAINRIGHT
HARDISTY
Iron Cr.
LACOMBE
Sylvan L.
ALIX
Buffalo L.
RED DEER
STETTLER
INNISFAIL
Lorraine
CASTOR
PROVOST
MACKLIN
Ribstone Cr.
Eyehill Cr.
Manitou Lake
Hamilton L.
Kirkpatrick L.
Grassy Island L.
Gough L.
Red Deer River
North Saskatchewan River
Sturgeon River
Redwater River
Pembina River
L. St. Ann
Fifth Meridian
Fourth Meridian
Boundary between Alberta and Saskatchewan
CANADIAN NORTHERN RY.
GRAND TRUNK PACIFIC RY.
CANADIAN PACIFIC RAILWAY
G. T. P. RY.
C. N. R.



S A S K A T C H E W A N
M A N I T
Beaver River
Montreal L.
Mossy River
Cumberland Lake
Moose L.
Paul de Metis
Hopkins
Moose
Frog Lake
Onion Lake
Forbesville
Ft. Pitt (Old Site)
Lea Park
Hewitt Landing
Tangleflags
Milleton
Vermilion
Lloydminster
Lashburn
Big Gully Cr.
Turtleford
Turtle Lake
Meota
Jack Fish L.
Murray L.
Battle River
Wainright
Hardisty
Provost
Macklin
Carruthers
Cutknife
North Battleford
Battleford
Agan
Wilkie
Oban
Biggar
Kerrobert
Radisson
Langham
Askwith
Hurdman
Warman
Saskatoon
Aberdeen
Vonda
Humboldt
Colonsay
Quill Lakes
Wadena
Big River
Shell Brook
Green L.
De Laronde L.
Cowan L.
Waskesiu L.
Candle L.
White Gull River
White Fox River
Torch River
Marcelin
Wingard
Carlton (Old Site)
Duck Lake
Laird
Rosthern
Lily Plain
Prince Albert
The Forks
La Colle Falls
Fort à la Corne
Lost River
Nipawin
Ravine Bank
Kinistino
Wakaw
St. Brieux
Melfort
Star City
Tisdale
Carrot Riv.
Red Deer
Hudson Bay Jc.
Red Deer L.
Dawson B.
Lake Winnipegosis
Swan Riv.
Pelly
Cumberland
The Big Bend
Saskeram L.
Le Pas
Cormorant L.
Namew L.
Cedar L.
Chemahawin
Moose L.
Pasquia Riv.
Sipanock
Fourth Meridian
Third Meridian
Second Meridian
Boundary between Alberta and Saskatchewan
Boundary between Saskatchewan and Manitoba
Canadian Northern Railway
Canadian Pacific Railway
G.T.P. Ry.
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57
111 110 109 108 107 106 105 104 103 102 101 100

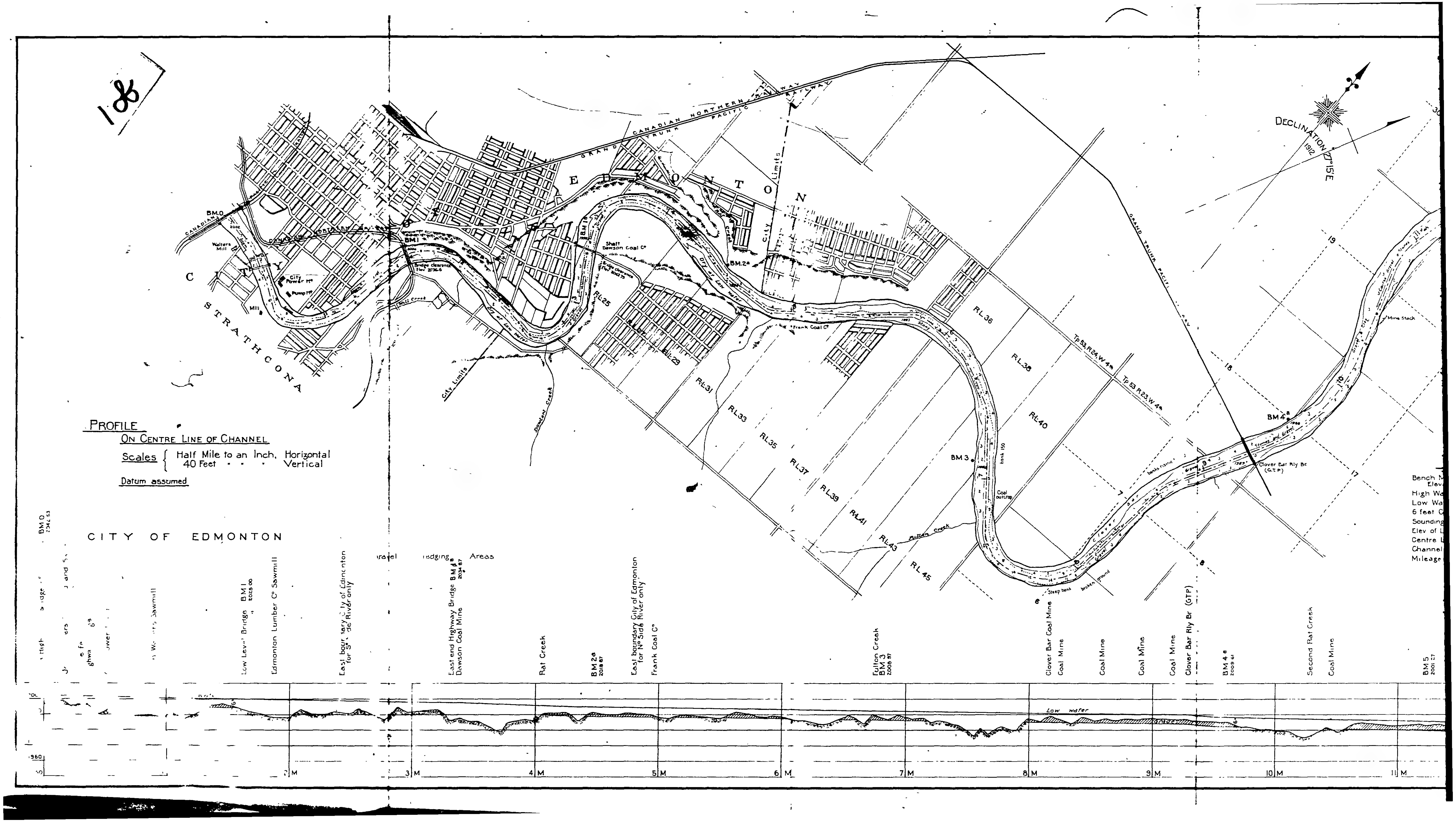
2 of

PLATE A



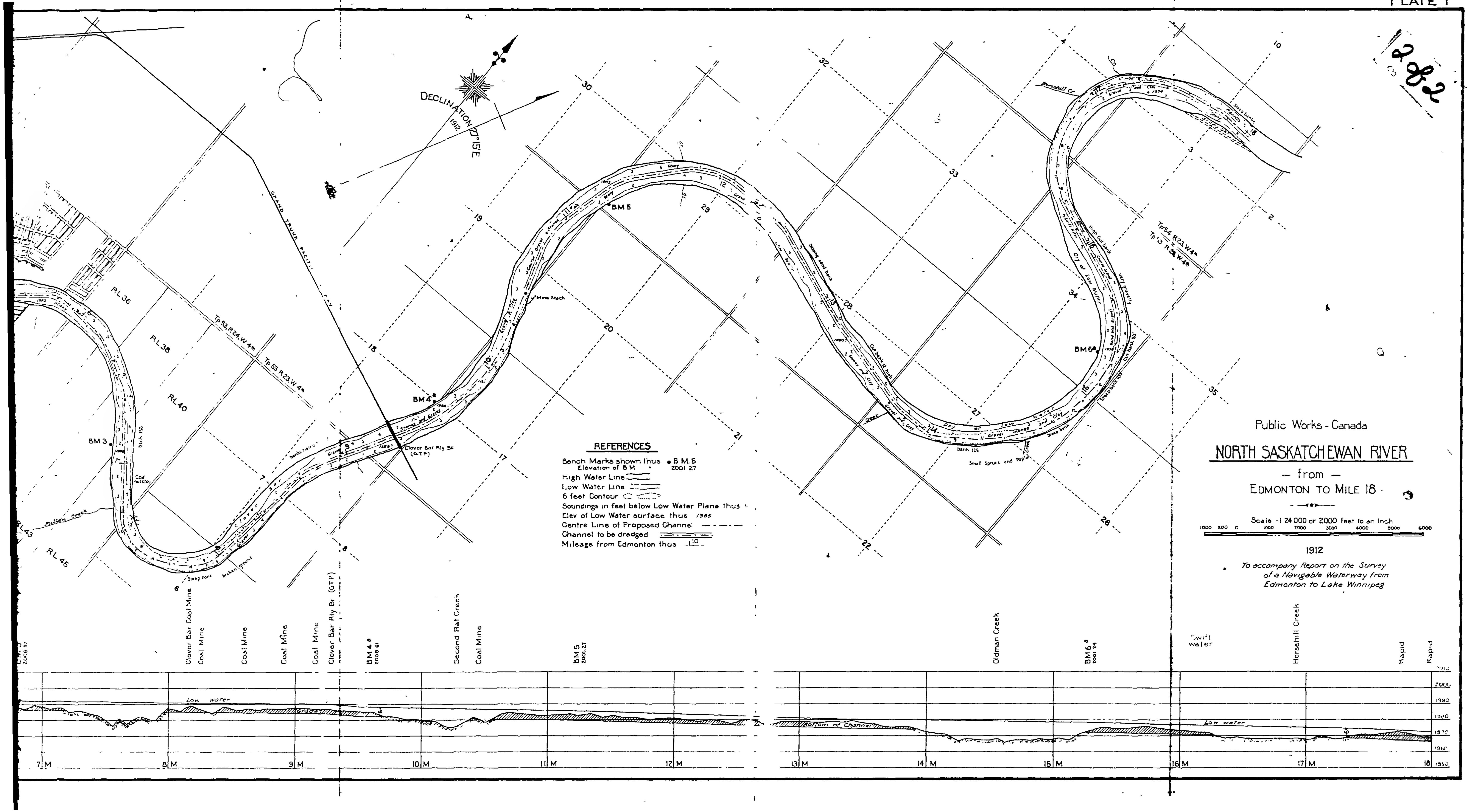
3083

Next Fiche

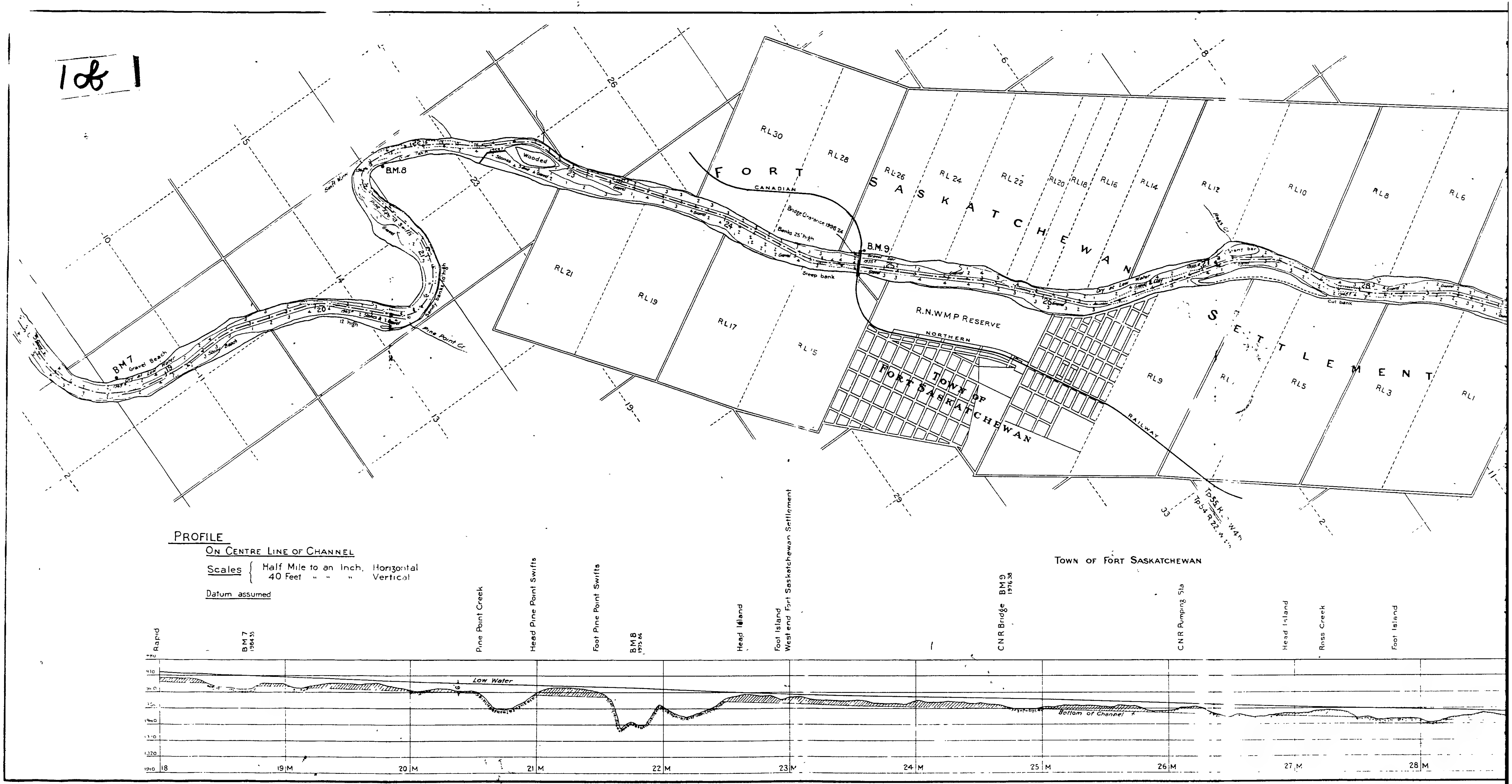


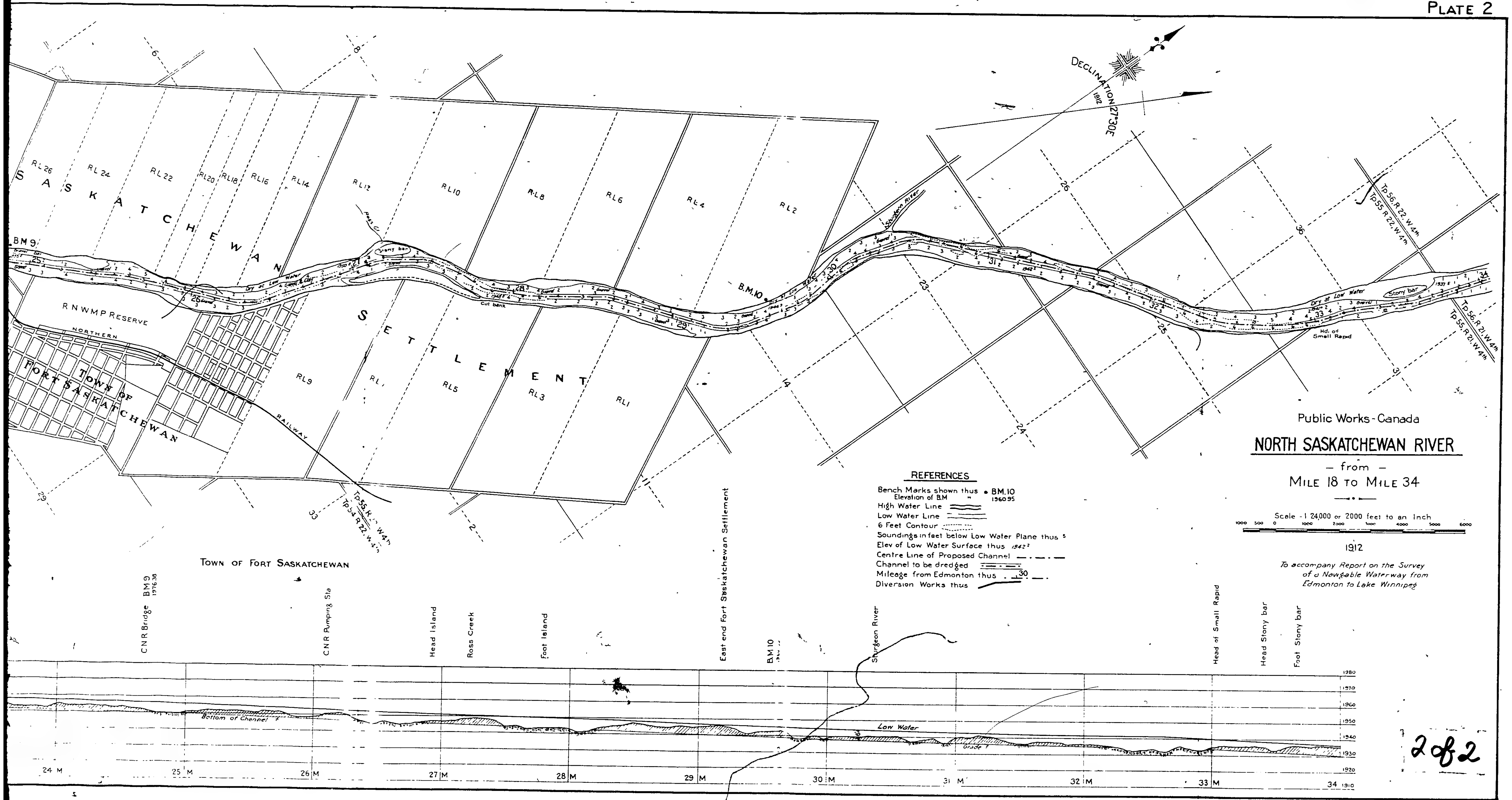
18
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet Vertical
Datum assumed
CITY OF EDMONTON
STRATHCONA
EDMONTON
CANADIAN NORTHERN RAILWAY
GRAND TRUNK PACIFIC RAILWAY
DECLINATION 27°15'E 1912
City Limits
Walters Mill
City Power Hse
Pump Hse
Shaft Dawson Coal Co
Frank Coal Co
Rat Creek
Fulton Creek
Clover Bar Rly Br (G.T.P.)
Coal outcrop
Steep bank
broken ground
Mine Stack
Tp 53 R 24 W 4th
Tp 53 R 23 W 4th
RL 25
RL 29
RL 31
RL 33
RL 35
RL 36
RL 37
RL 38
RL 39
RL 40
RL 41
RL 43
RL 45
BM 0
BM 1
BM 2a
BM 3
BM 4a
Low Level Bridge BM 1
Edmonton Lumber Co Sawmill
East End Highway Bridge BM 2b
Dawson Coal Mine
Rat Creek
BM 2a 2018.87
East boundary City of Edmonton for No Side River only
Frank Coal Co
Fulton Creek BM 3 2008.57
Clover Bar Coal Mine
Coal Mine
Coal Mine
Coal Mine
Coal Mine
Clover Bar Rly Br (GTP)
BM 4a 2009.61
Second Rat Creek
Coal Mine
BM 5
Gravel Dredging Areas
Low water
Bench M
High Wa
Low Wa
Sounding
Channel
Mileage
2 M
3 M
4 M
5 M
6 M
7 M
8 M
9 M
10 M
11 M

PLATE I



Public Works - Canada
NORTH SASKATCHEWAN RIVER
– from –
EDMONTON TO MILE 18
Scale - 1:24 000 or 2000 feet to an Inch
1000 500 0 1000 2000 3000 4000 5000 6000
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B.M.5
Elevation of B.M. 2001.27
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus 1985
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 10
DECLINATION 27°15'E 1912
GRAND TRUNK PACIFIC RAY
Clover Bar Rly Br (G.T.P.)
Tp 53 R 24 W 4th
Tp 53 R 23 W 4th
Tp 54 R 23 W 4th
Tp 53 R 23 W 4th
RL 36
RL 38
RL 40
RL 43
RL 45
BM 3
BM 4
BM 5
BM 6
Mine Stack
Coal outcrop
Steep bank
Horsehill Cr.
Small Spruce and Poplar
Clover Bar Coal Mine
Coal Mine
Coal Mine
Coal Mine
Coal Mine
Clover Bar Rly Br (GTP)
BM 4 2009.61
Second Rat Creek
Coal Mine
BM 5 2001.27
Oldman Creek
BM 6 2001.24
Swift water
Horsehill Creek
Rapid
Rapid
Low water
Bottom of Channel
Low water
7 M
8 M
9 M
10 M
11 M
12 M
13 M
14 M
15 M
16 M
17 M
18
2000
1990
1980
1970
1960
1950


1 of 1
FORT SASKATCHEWAN SETTLEMENT
TOWN OF FORT SASKATCHEWAN
CANADIAN NORTHERN RAILWAY
R.N.W.M.P. RESERVE
RL 30
RL 28
RL 26
RL 24
RL 22
RL 20
RL 18
RL 16
RL 14
RL 12
RL 10
RL 8
RL 6
RL 21
RL 19
RL 17
RL 15
RL 9
RL 5
RL 3
RL 1
B.M.7
B.M.8
B.M.9
Gravel Beach
Stony Beach
Wooded
Pine Point Cr.
Bridge Clearance 1996.24
Banks 25' high
Steep bank
Stony bar
Cut bank
Ross Cr.
Tp.55 R.22 W.4th
Tp.54 R.22 W.4th
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
TOWN OF FORT SASKATCHEWAN
Rapid
BM 7 1984.35
Pine Point Creek
Head Pine Point Swifts
Foot Pine Point Swifts
BM 8 1975.64
Head Island
Foot Island
West end Fort Saskatchewan Settlement
CNR Bridge BM 9 1976.38
CNR Pumping Sta
Head Island
Ross Creek
Foot Island
Low Water
Bottom of Channel
18
19 M
20 M
21 M
22 M
23 M
24 M
25 M
26 M
27 M
28 M



Public Works-Canada
NORTH SASKATCHEWAN RIVER
– from –
MILE 18 TO MILE 34
Scale - 1 24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • BM.10
Elevation of B.M. 1960.95
High Water Line
Low Water Line
6 Feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1942
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 30
Diversion Works thus
DECLINATION 1912 27°30'E
SASKATCHEWAN SETTLEMENT
TOWN OF FORT SASKATCHEWAN
R N W M P RESERVE
NORTHERN RAILWAY
Sturgeon River
Stony bar
Dry at Low Water
Hd. of Small Rapid
Cut bank
BM 9
BM.10
Tp.56.R.22.W.4th
Tp.55.R.22.W.4th
Tp.56.R.21.W.4th
Tp.55.R.21.W.4th
Tp.55.R.22.W.4th
Tp.54.R.22.W.4th
RL 26
RL 24
RL 22
RL 20
RL 18
RL 16
RL 14
RL 12
RL 10
RL 8
RL 6
RL 4
RL 2
RL 9
RL 7
RL 5
RL 3
RL 1
Town of Fort Saskatchewan
CNR Bridge BM9 1976.38
CNR Pumping Sta
Head Island
Ross Creek
Foot Island
East end Fort Saskatchewan Settlement
B.M.10
Sturgeon River
Head of Small Rapid
Head Stony bar
Foot Stony bar
Bottom of Channel
Low Water
Grade
1980
1970
1960
1950
1940
1930
1920
1910
24 M
25 M
26 M
27 M
28 M
29 M
30 M
31 M
32 M
33 M
34

2 of 2

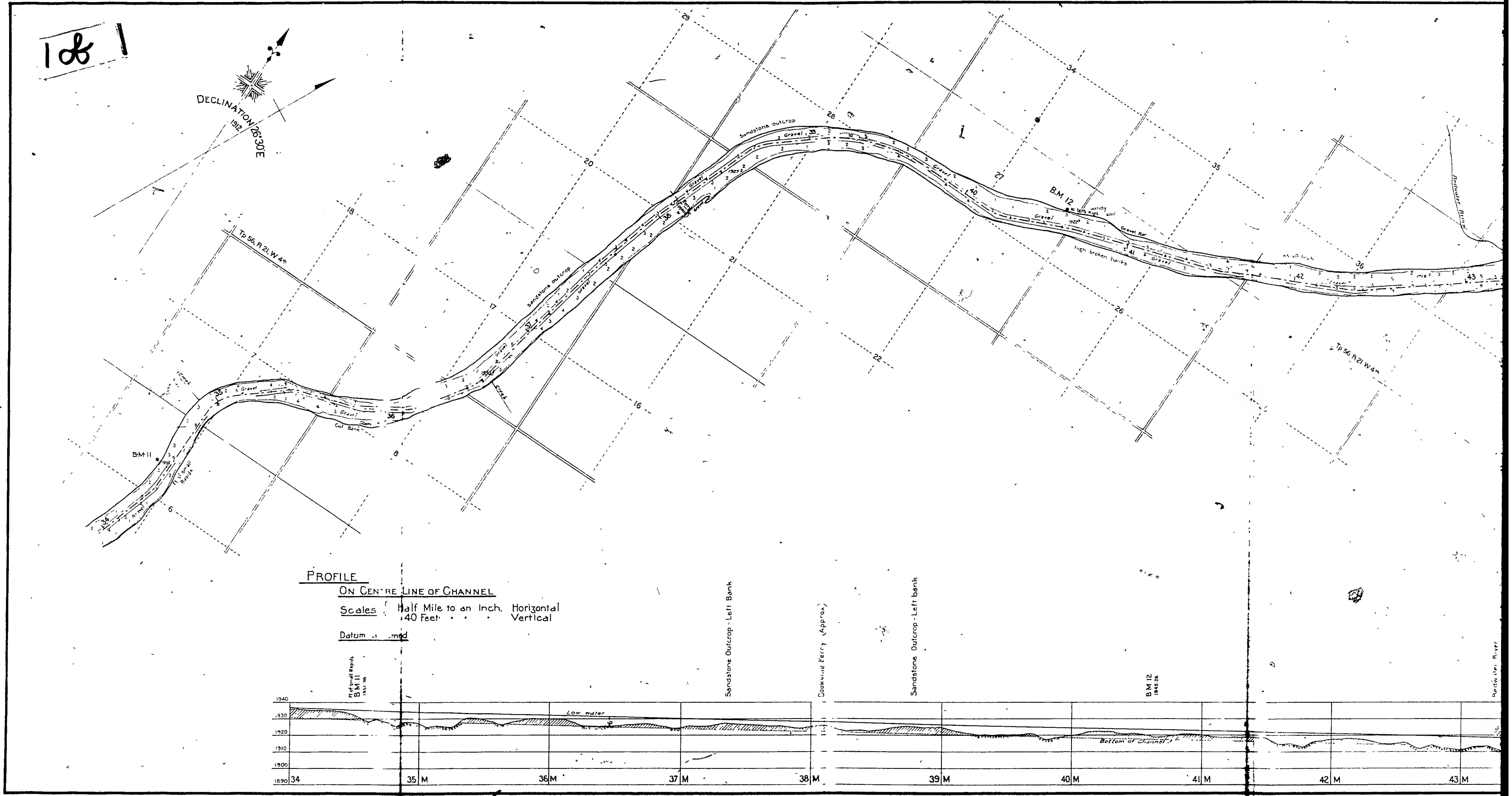
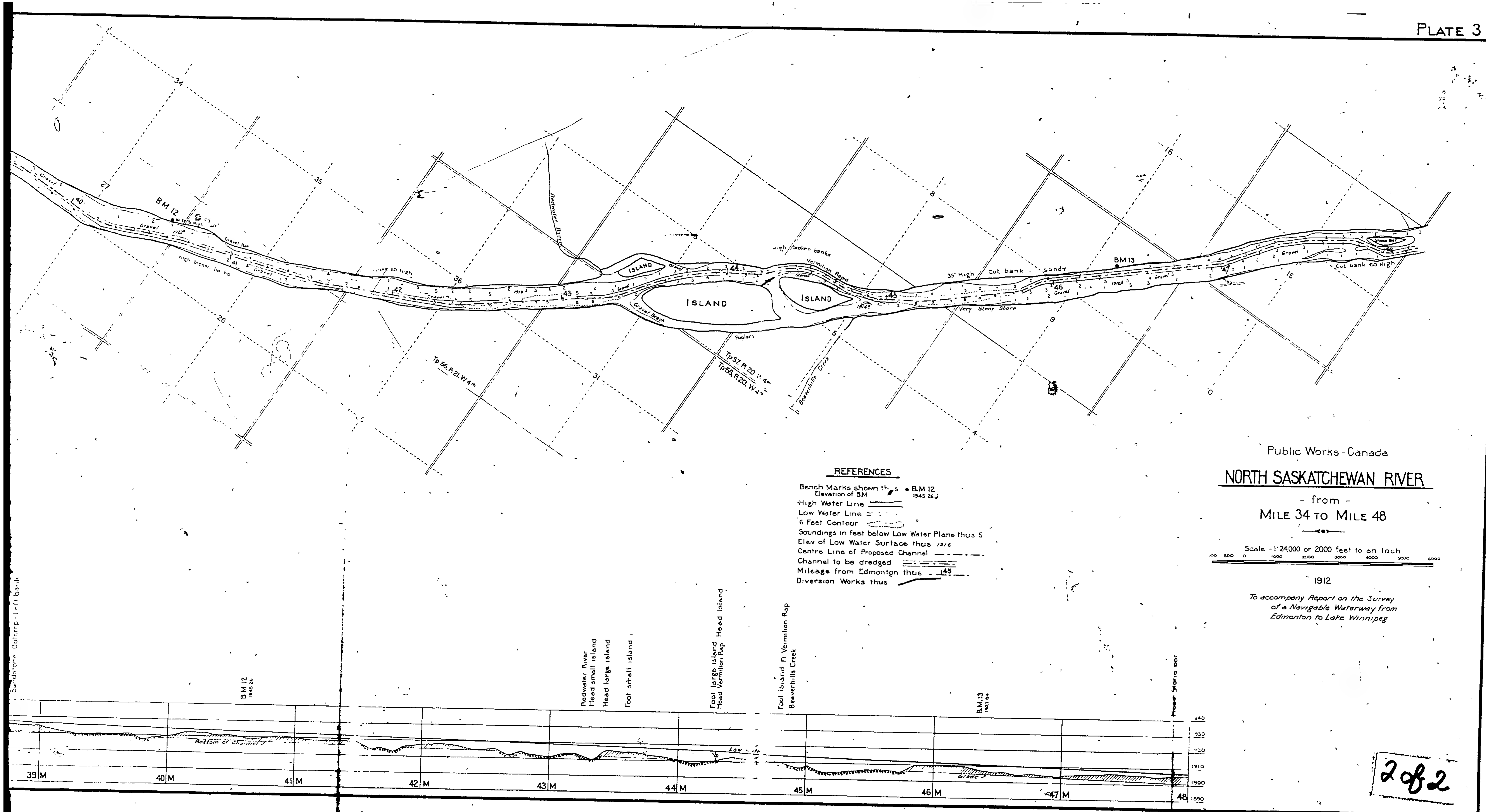

18
DECLINATION 26°30'E
1912
Tp 56, R 21, W 4th
Sandstone outcrop
Gravel
B.M 11
B.M 12
High broken banks
Gravel Bar
Tp 56 R 21 W 4th
PROFILE
ON CENTRE LINE OF CHANNEL
Scales: Half Mile to an Inch, Horizontal
40 Feet Vertical
Datum assumed
Sandstone Outcrop - Left Bank
Soukvine Ferry (Approx)
Sandstone Outcrop - Left bank
Low water
Bottom of Channel
1940
1930
1920
1910
1900
1890
34
35 M
36 M
37 M
38 M
39 M
40 M
41 M
42 M
43 M

PLATE 3



Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 34 TO MILE 48
Scale - 1:24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B.M 12
Elevation of B.M 1945 26
High Water Line
Low Water Line
6 Feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1916
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 45
Diversion Works thus
ISLAND
ISLAND
ISLAND
B.M 12
BM 13
Redwater River
Vermilion Rapid
High broken banks
35' High Cut bank - sandy
Cut bank 60' High
Very Stony Shore
Gravel Beach
Poplars
Beaverhills Creek
Stone Bar
Tp 56, R 21, W 4 m
Tp 57, R 20, W 4 m
Tp 56, R 20, W 4 m
Sandstone Outcrop - Left bank
Redwater River
Head small island
Head large island
Foot small island
Foot large island
Head Vermilion Rap
Head Island
Foot Island Ft Vermilion Rap
Beaverhills Creek
B.M.13
Bottom of Channel
Low Water
Grade
39 M
40 M
41 M
42 M
43 M
44 M
45 M
46 M
47 M
48 M

2 of 2

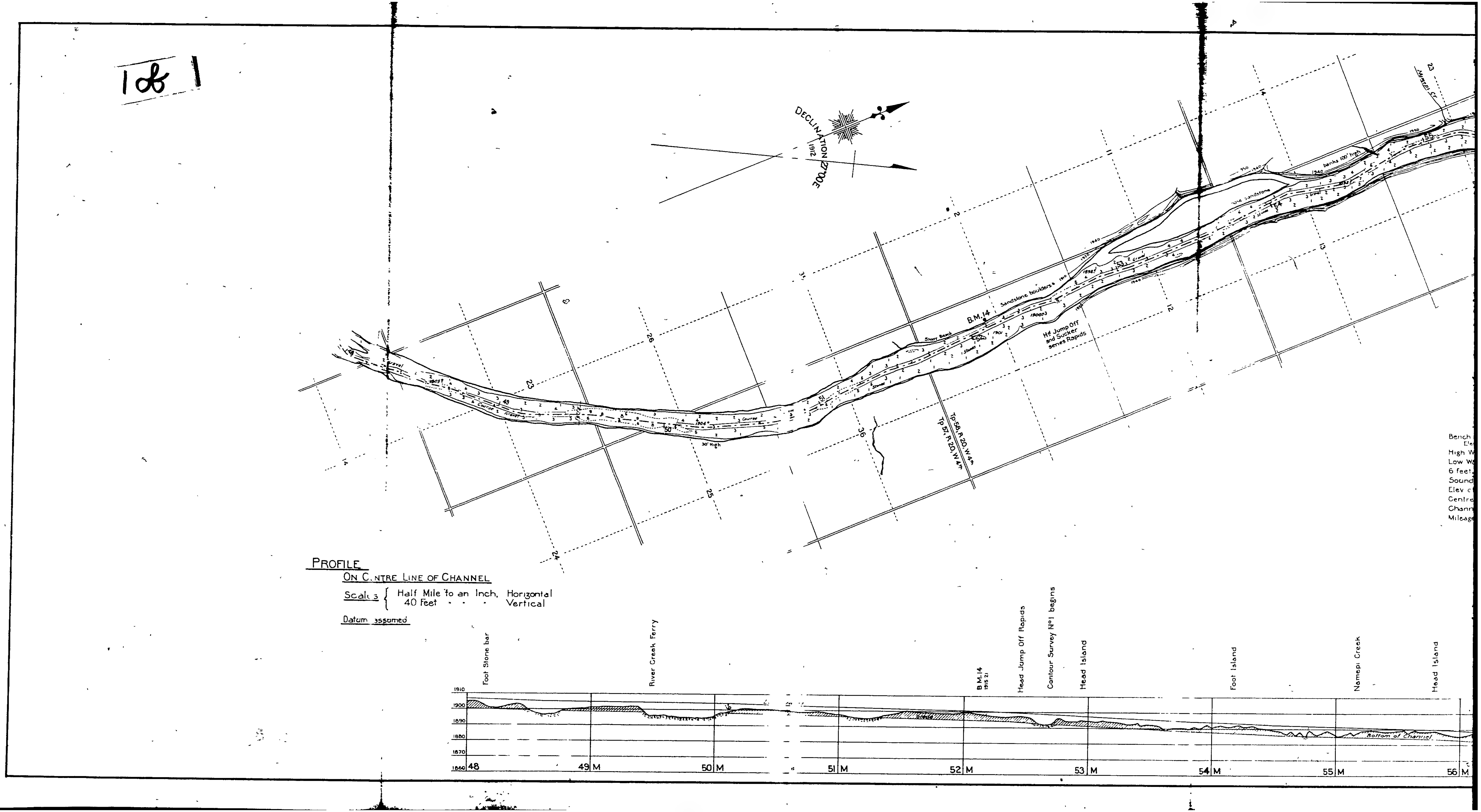
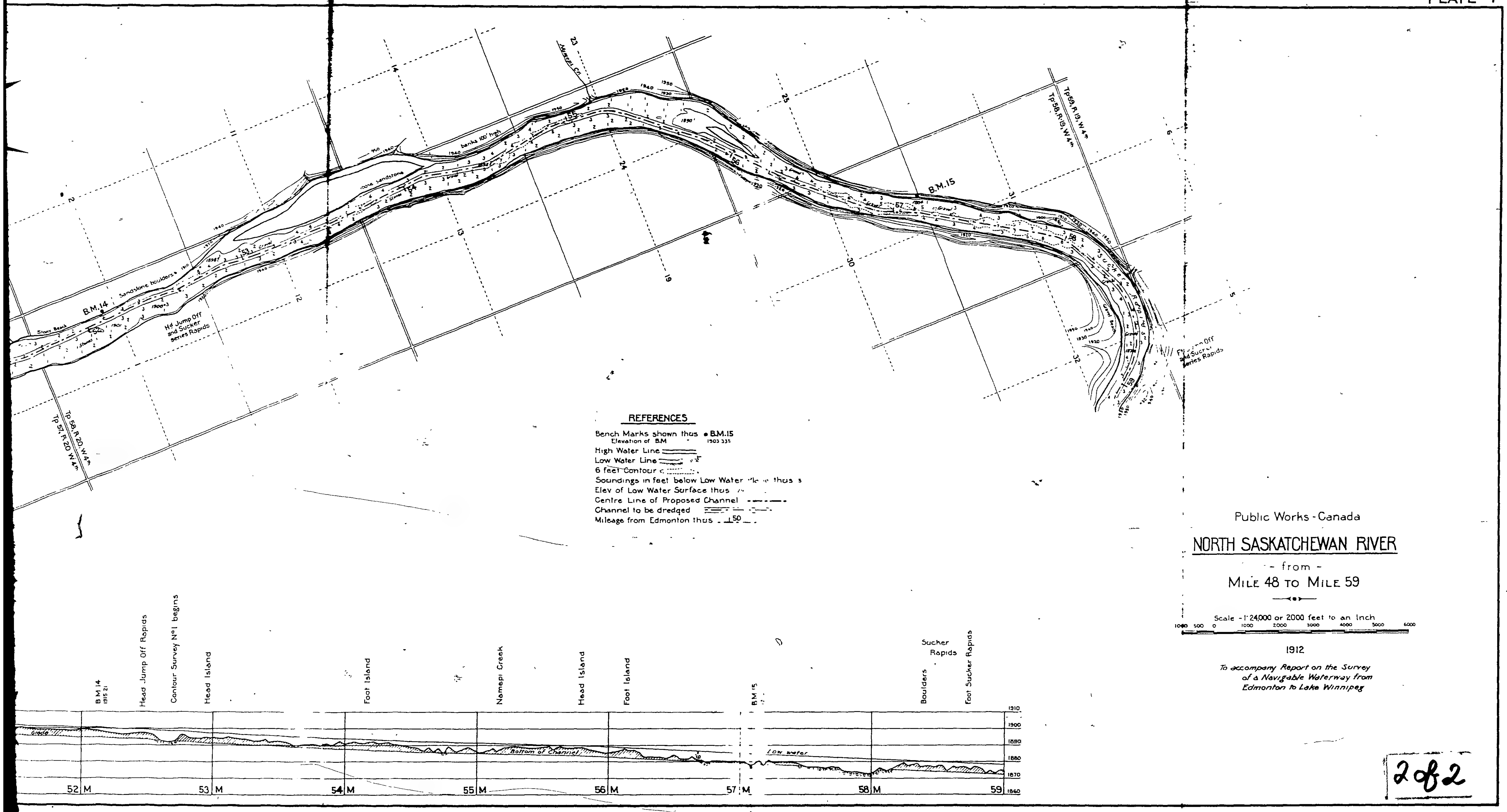
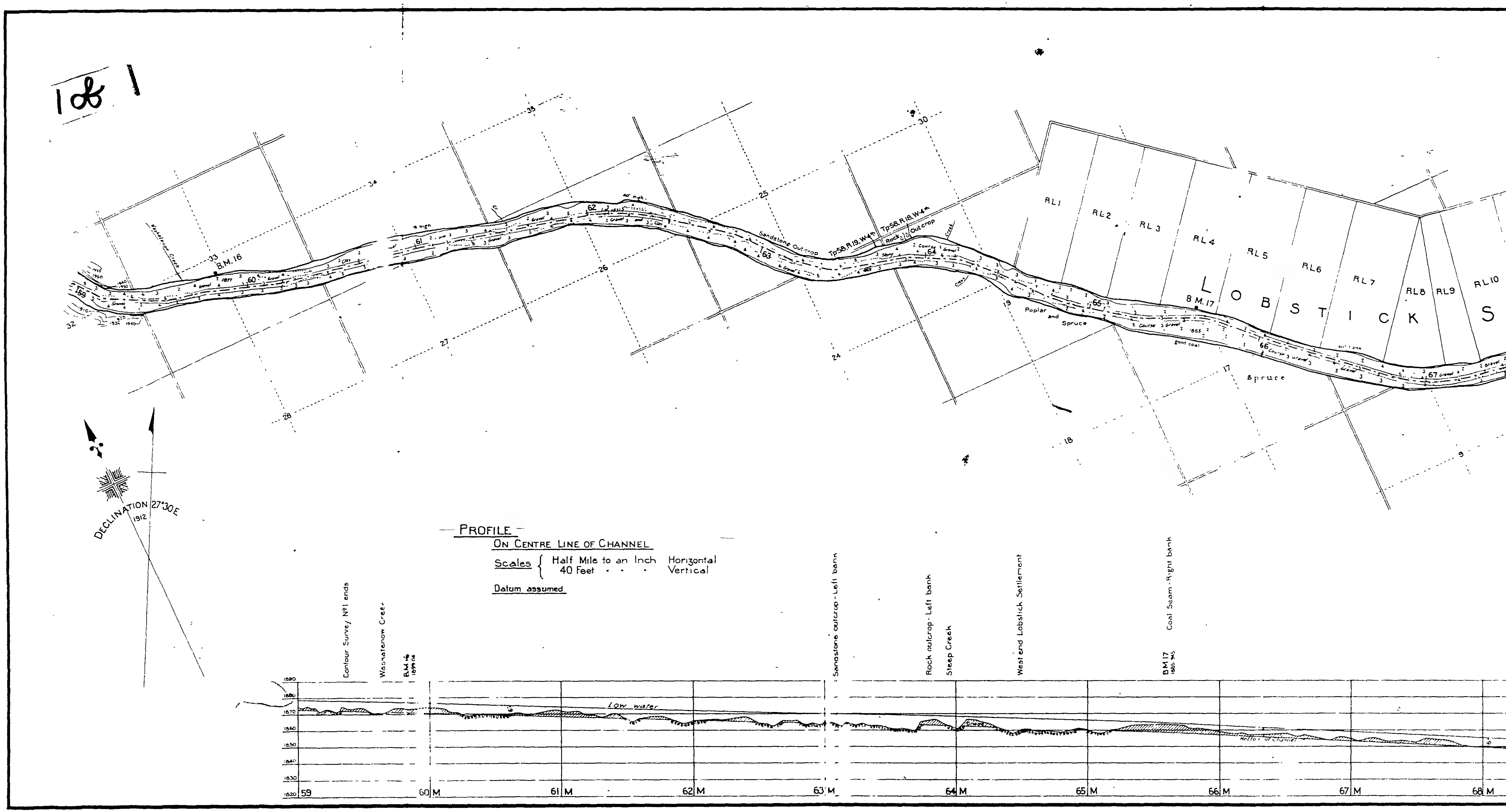

1 of 1
DECLINATION 27°00'E 1912
B.M.14
Sandstone boulders
Stony Beach
Hd Jump Off and Sucker series Rapids
banks 100' high
Tp 58, R. 20, W. 4th
Tp 57, R. 20, W. 4th
30' High
Bench
High W
Low W
6 feet
Sound
Elev
Centre
Chann
Mileage
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet - - - Vertical
Datum assumed
Foot Stone bar
River Creek Ferry
B.M.14
Head Jump Off Rapids
Contour Survey No 1 begins
Head Island
Foot Island
Namepi Creek
Head Island
Grade
Bottom of Channel
1910
1900
1890
1880
1870
1860
48
49 M
50 M
51 M
52 M
53 M
54 M
55 M
56 M

PLATE 4

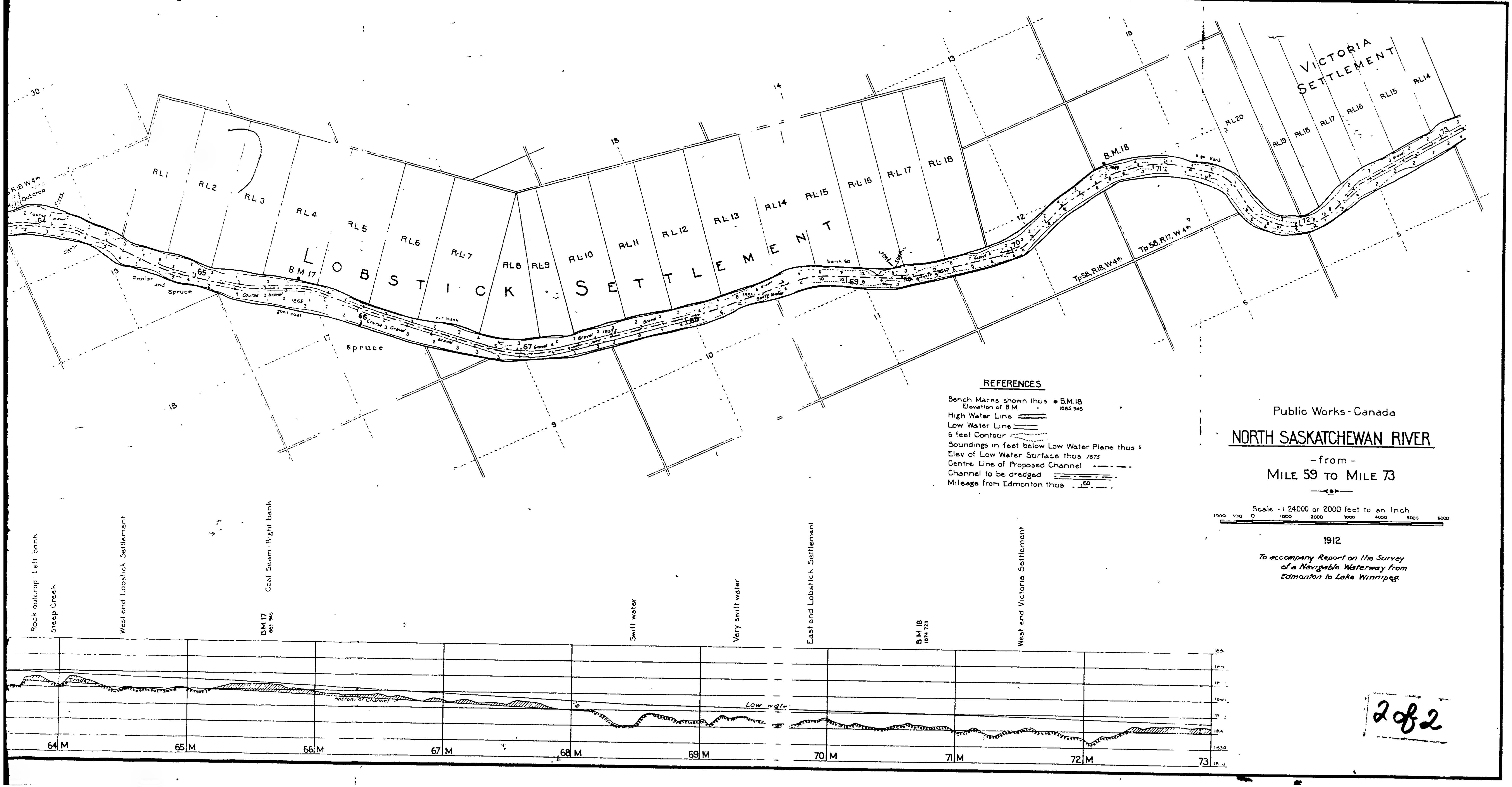


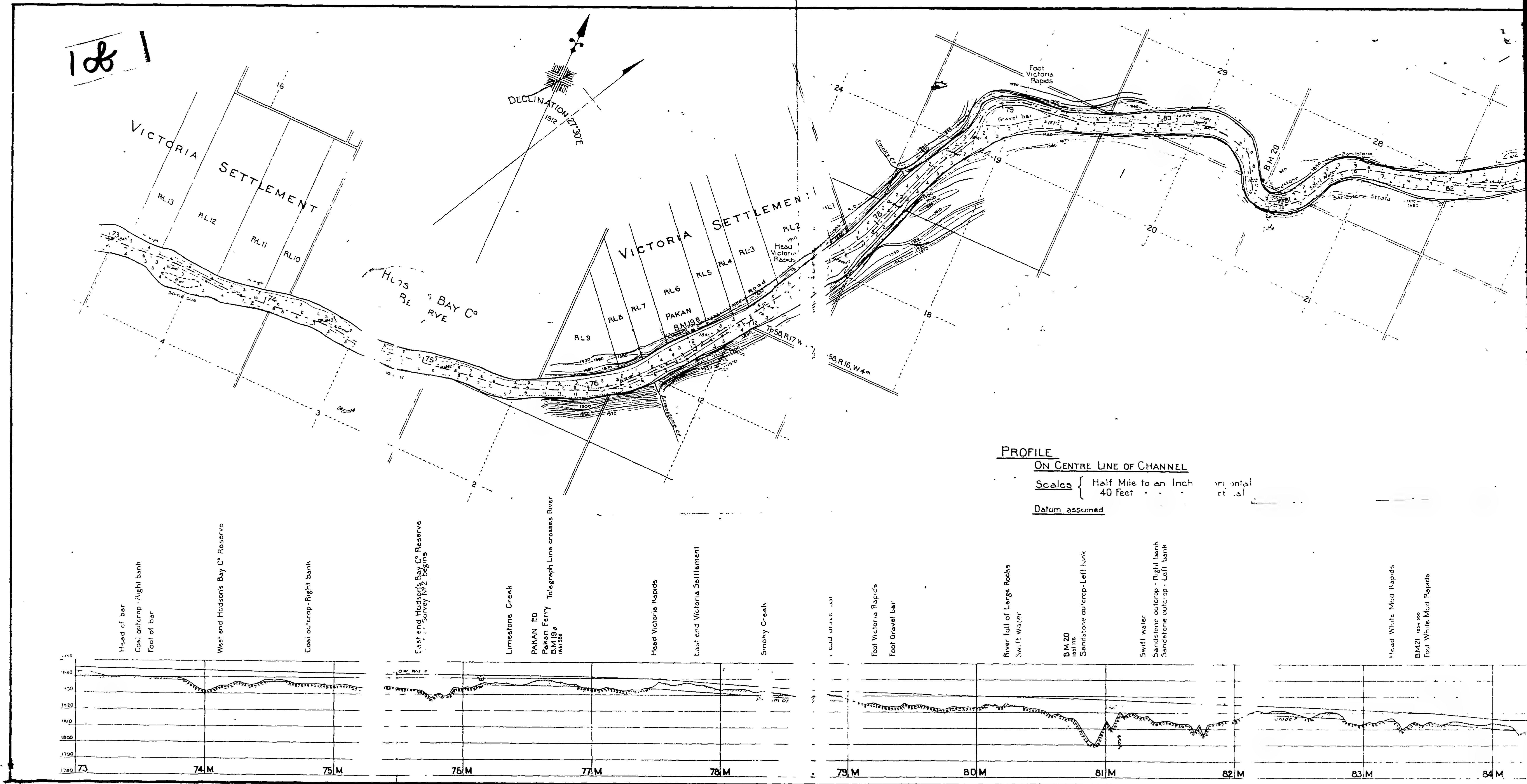
REFERENCES
Bench Marks shown thus • B.M.15
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 50
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 48 TO MILE 59
Scale - 1:24,000 or 2000 feet to an Inch
1000 500 0 1000 2000 3000 4000 5000 6000
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
Tp.58, R.20, W.4th
Tp.57, R.20, W.4th
Tp.59, R.19, W.4th
Tp.58, R.19, W.4th
B.M.14
B.M.15
Stony Beach
Sandstone boulders
Hd Jump Off and Sucker series Rapids
banks 100' high
loose sandstone
Namepi Cr.
Sucker Rapids
B.M.14 1915.21
Head Jump Off Rapids
Contour Survey No 1 begins
Head Island
Foot Island
Namepi Creek
Head Island
Foot Island
B.M.15
Sucker Rapids
Boulders
Foot Sucker Rapids
Grade
Bottom of Channel
Low water
52 M
53 M
54 M
55 M
56 M
57 M
58 M
59
1910
1900
1890
1880
1870
1860
2 of 2

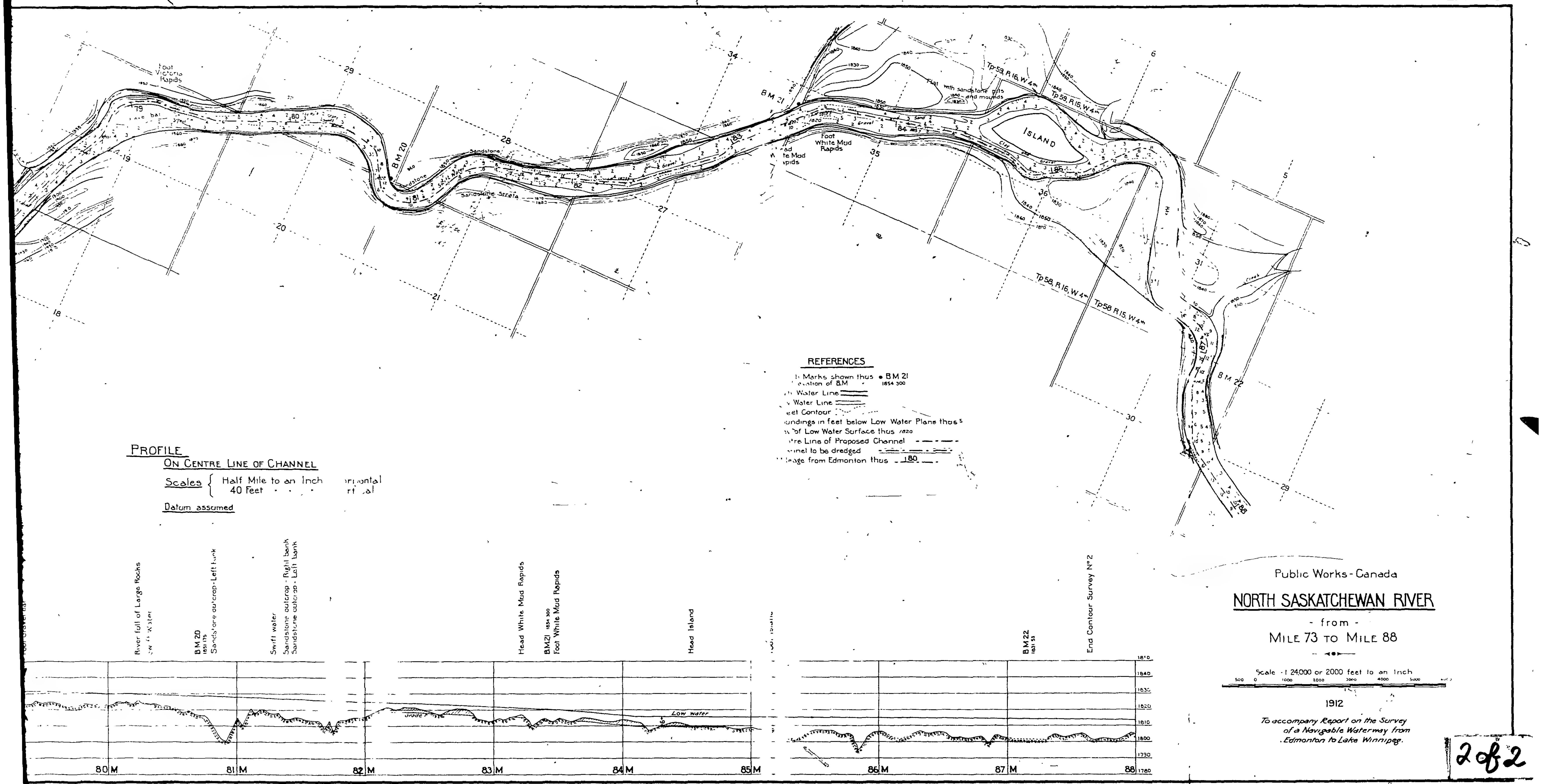


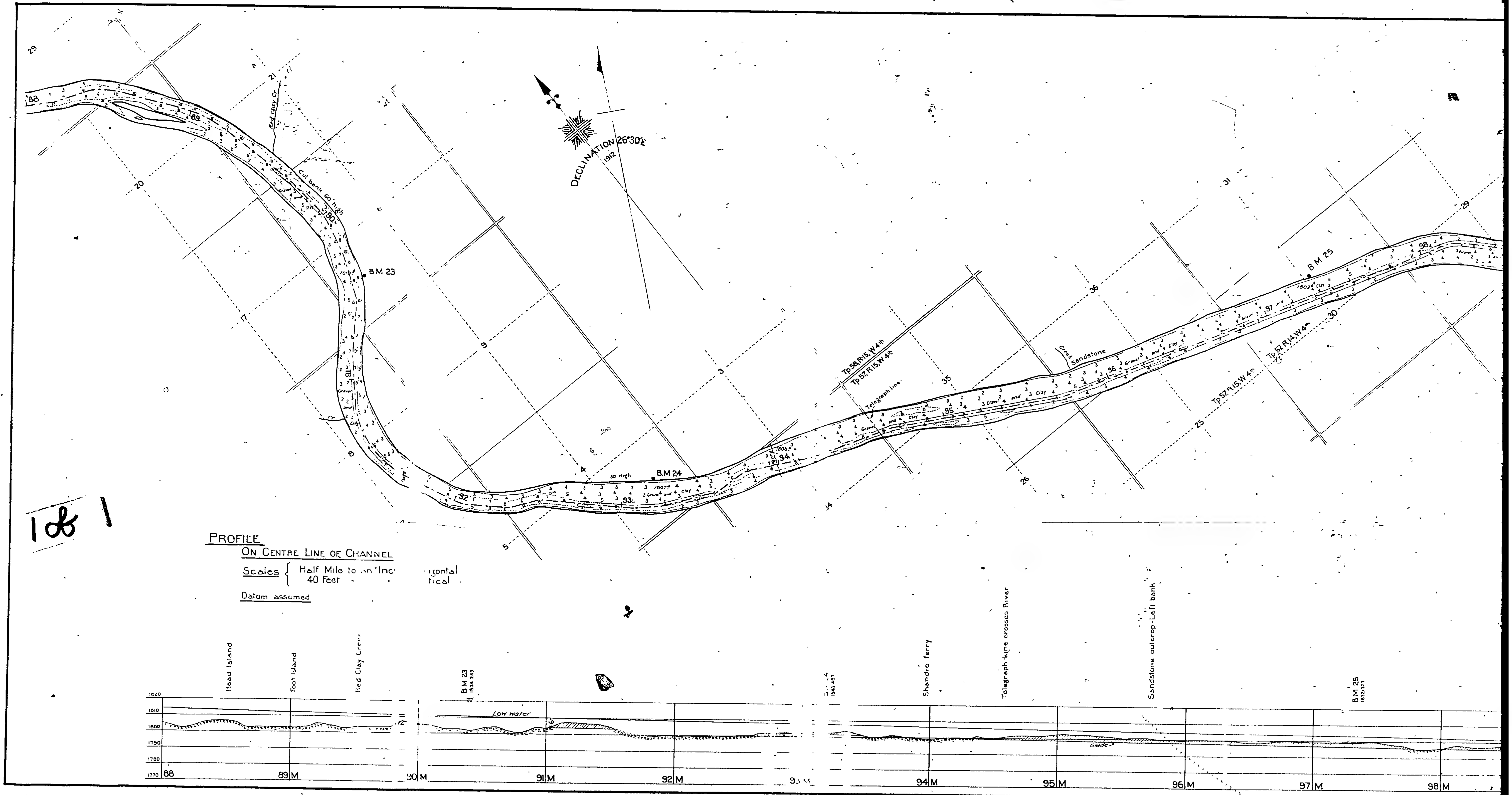
B.M.16
Washatenow Creek
Sandstone Outcrop
Tp58.R.19.W.4th
Tp58.R.18.W.4th
Rock Outcrop
Poplar and Spruce
Spruce
B.M.17
RL1
RL2
RL3
RL4
RL5
RL6
RL7
RL8
RL9
RL10
LOBSTICK S
DECLINATION 27°30'E 1912
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch Horizontal
40 Feet Vertical
Datum assumed
Contour Survey No1 ends
Washatenow Creek
Sandstone outcrop - Left bank
Rock outcrop - Left bank
Steep Creek
West end Lobstick Settlement
Coal Seam - Right bank
Low water
59
60 M
61 M
62 M
63 M
64 M
65 M
66 M
67 M
68 M

PLATE 5

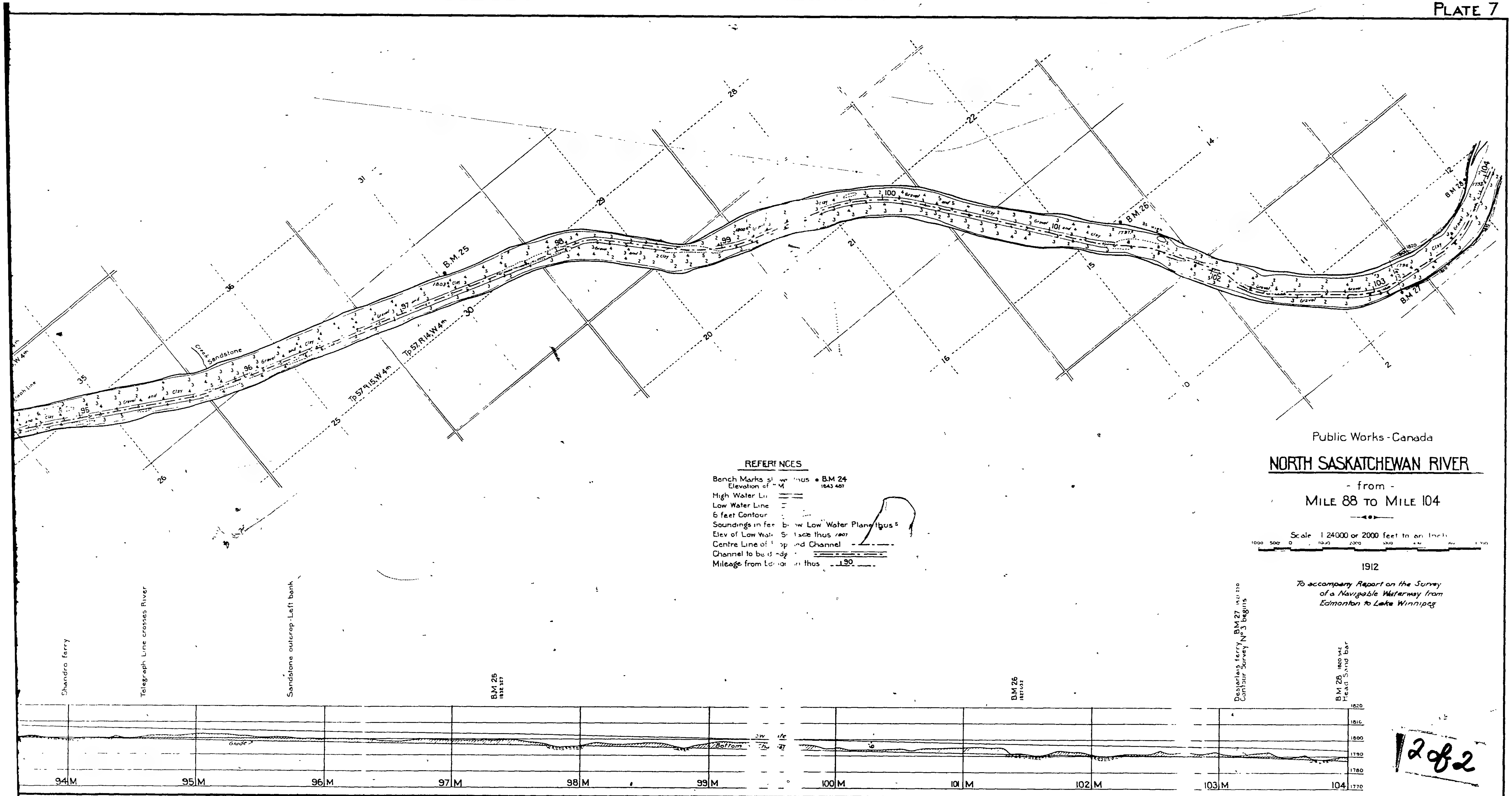

LOBSTICK SETTLEMENT
VICTORIA SETTLEMENT
R.L.1
R.L.2
R.L.3
R.L.4
R.L.5
R.L.6
R.L.7
R.L.8
R.L.9
R.L.10
R.L.11
R.L.12
R.L.13
R.L.14
R.L.15
R.L.16
R.L.17
R.L.18
R.L.20
R.L.19
R.L.18
R.L.17
R.L.16
R.L.15
R.L.14
B.M.17
B.M.18
Poplar and Spruce
Spruce
Outcrop
Creek
good coal
cut bank
Tp.58, R.18, W.4th
Tp.58, R.17, W.4th
REFERENCES
Bench Marks shown thus ● B.M.18
Elevation of B.M. 1885.545
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1875
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 60
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 59 TO MILE 73
Scale - 1:24,000 or 2000 feet to an inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
Rock outcrop - Left bank
Steep Creek
West end Lobstick Settlement
B.M.17 1885.545
Coal Seam - Right bank
Swift water
Very swift water
East end Lobstick Settlement
B.M.18 1874.723
West end Victoria Settlement
Bottom of Channel
Low water
64 M
65 M
66 M
67 M
68 M
69 M
70 M
71 M
72 M
73
2 of 2


1 & 1
DECLINATION 1912 27°30'E
VICTORIA SETTLEMENT
RL13
RL12
RL11
RL10
HUDSON'S BAY Co RESERVE
VICTORIA SETTLEMENT
RL9
RL8
RL7
RL6
RL5
RL4
RL3
RL2
RL1
PAKAN
B.M.19a
Head Victoria Rapids
Tp58,R17W
58,R16,W4m
Limestone Cr
Smoky Cr
Foot Victoria Rapids
Gravel bar
Sandstone
Sandstone Strata
B.M.20
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch Horizontal
40 Feet Vertical
Datum assumed
Head of bar
Coal outcrop - Right bank
Foot of bar
West end Hudson's Bay Co Reserve
Coal outcrop - Right bank
East end Hudson's Bay Co Reserve
Survey No 2 begins
Limestone Creek
PAKAN P.O.
Pakan Ferry
B.M.19a
Telegraph Line crosses River
Head Victoria Rapids
East end Victoria Settlement
Smoky Creek
Foot Victoria Rapids
Foot Gravel bar
River full of Large Rocks
Swift Water
B.M.20
Sandstone outcrop - Left bank
Swift water
Sandstone outcrop - Right bank
Sandstone outcrop - Left bank
Head White Mud Rapids
B.M.21
Foot White Mud Rapids
1850
1840
1830
1820
1810
1800
1790
1780
73
74 M
75 M
76 M
77 M
78 M
79 M
80 M
81 M
82 M
83 M
84 M


Foot Victoria Rapids
BM 20
Sandstone Strata
BM 21
Foot White Mud Rapids
ISLAND
Flat with sandstone pits and mounds
Tp 59, R 16, W 4th
Tp 59, R 15, W 4th
Tp 58, R 16, W 4th
Tp 58, R 15, W 4th
BM 22
REFERENCES
PROFILE
ON CENTRE LINE OF CHANNEL
Datum assumed
River full of Large Rocks
BM 20
Sandstone outcrop - Left bank
Swift water
Sandstone outcrop - Right bank
Sandstone outcrop - Left bank
Head White Mud Rapids
BM 21
Foot White Mud Rapids
Head Island
BM 22
End Contour Survey No 2
Low water
Grade
80 M
81 M
82 M
83 M
84 M
85 M
86 M
87 M
88 M
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 73 TO MILE 88
Scale 1:24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
2 of 2



DECLINATION 26°30'E
1912
B.M 23
B.M 24
B.M 25
Red Clay Cr.
Cut bank 60 high
30 High
Telegraph Line
Sandstone
Tp.58.R.15.W.4th
Tp.57.R.15.W.4th
Tp.57.R.14.W.4th
Tp.57.R.15.W.4th
Gravel and Clay
1 of 1
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch Horizontal
40 Feet Vertical
Datum assumed
Head Island
Foot Island
Red Clay Creek
Shandro ferry
Telegraph Line crosses River
Sandstone outcrop Left bank
Low water
Grade
88
89 M
90 M
91 M
92 M
93 M
94 M
95 M
96 M
97 M
98 M



Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 88 TO MILE 104
Scale 1:24000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks
Elevation of
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 90
B.M. 25
B.M. 26
B.M. 27
B.M. 28
Tp. 57 R. 15 W. 4th
Tp. 57 R. 14 W. 4th
Sandstone
Gravel and Clay
Shandro ferry
Telegraph Line crosses River
Sandstone outcrop - Left bank
Desjarlais ferry B.M. 27
Contour Survey No. 3 begins
Head Sand bar
Grade
Bottom
94 M
95 M
96 M
97 M
98 M
99 M
100 M
101 M
102 M
103 M
104
2 of 2

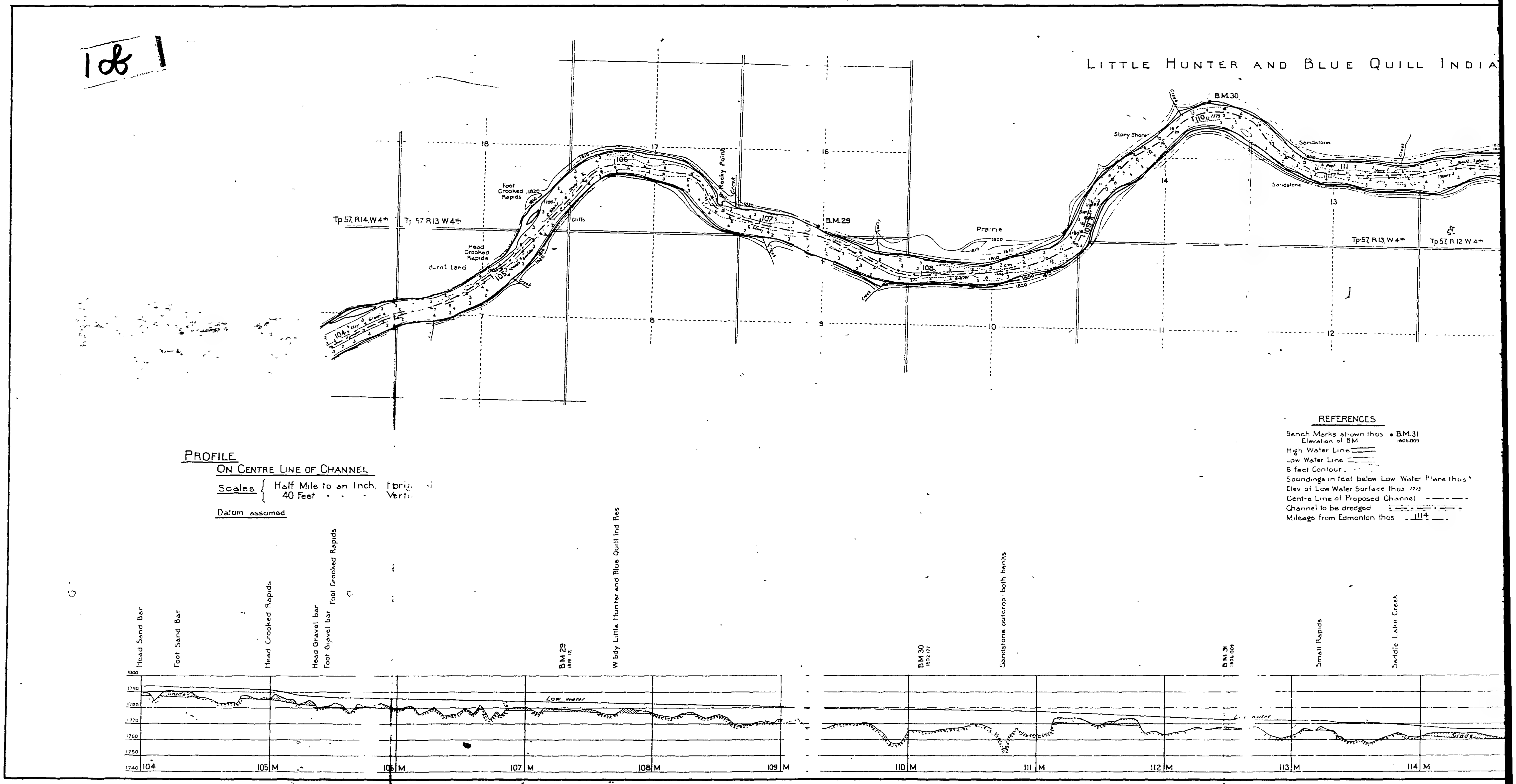
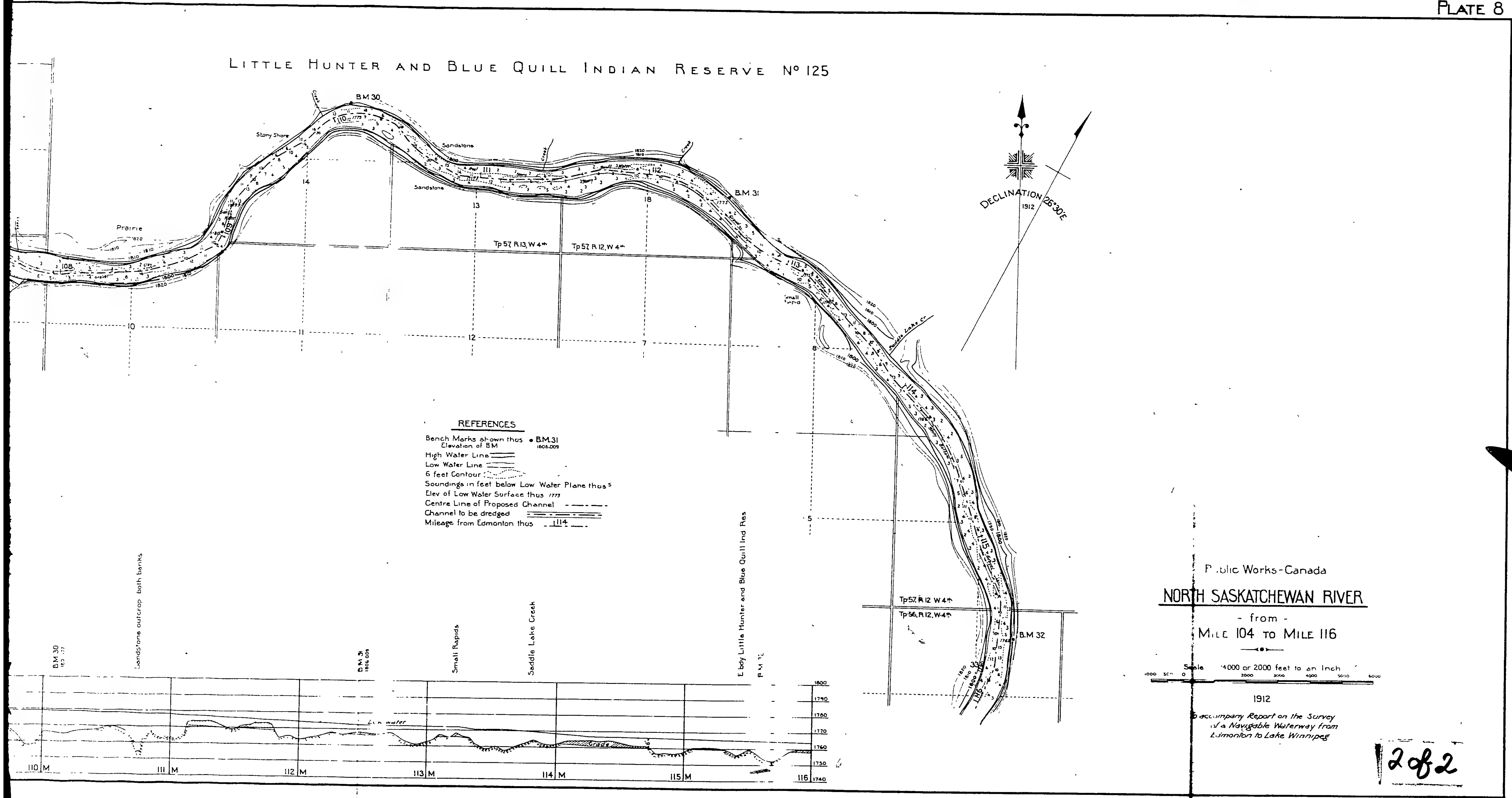
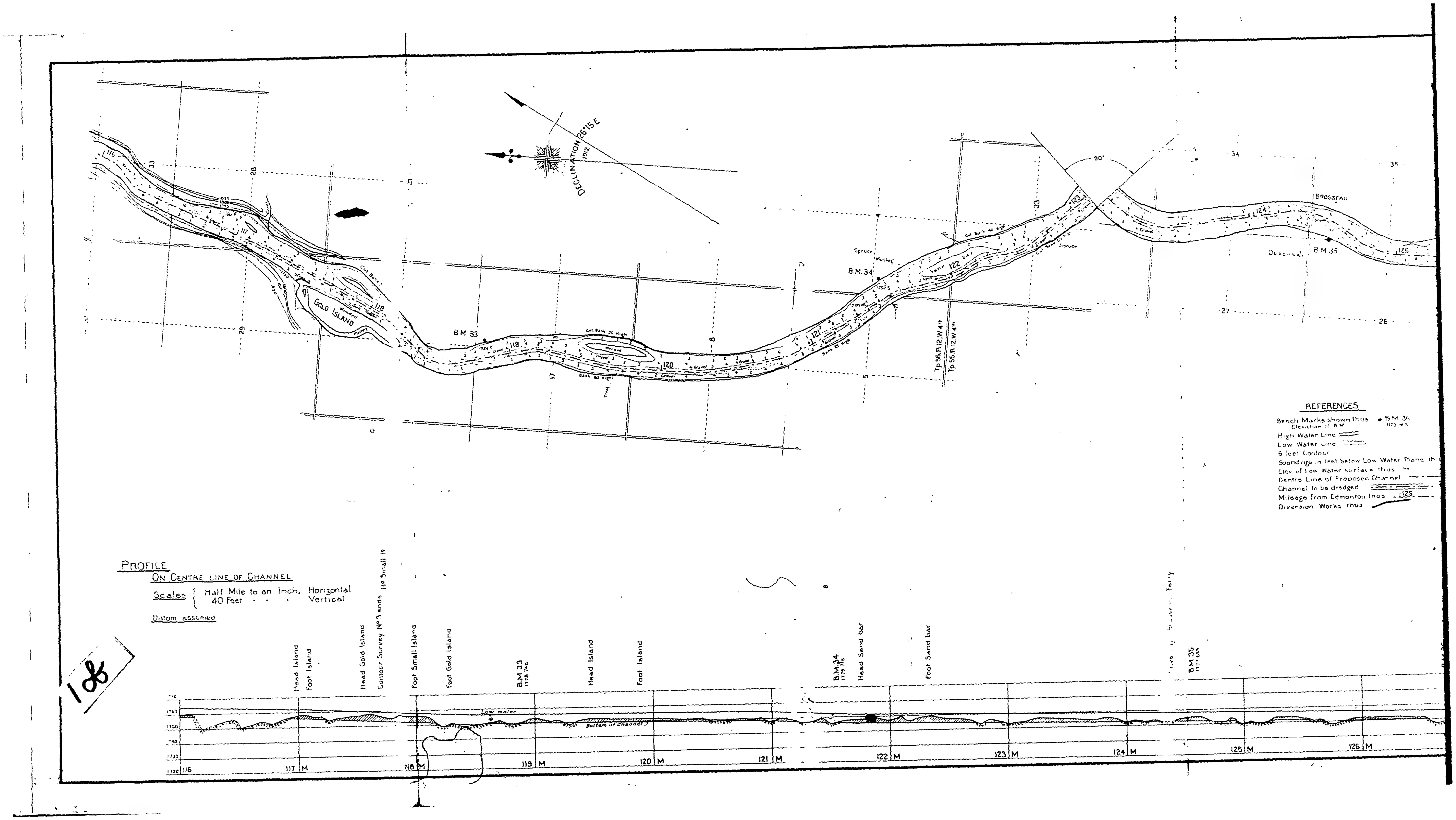

1 of 1
LITTLE HUNTER AND BLUE QUILL INDIA
Tp 57, R14, W 4th
Tp 57 R13 W 4th
Tp 57, R13, W 4th
Tp 57, R12 W 4th
Foot Crooked Rapids
Head Crooked Rapids
Burnt Land
Cliffs
Rocky Point
Creek
B.M.29
B.M.30
Prairie
Stony Shore
Sandstone
REFERENCES
Bench Marks shown thus • B.M.31 1806.009
Elevation of BM
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1773
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 114
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horiz. 40 Feet Vert.
Datum assumed
Head Sand Bar
Foot Sand Bar
Head Crooked Rapids
Head Gravel bar
Foot Gravel bar
Foot Crooked Rapids
B.M.29
W bdy Little Hunter and Blue Quill Ind Res
B.M.30
Sandstone outcrop - both banks
B.M.31
Small Rapids
Saddle Lake Creek
Grade
Low water
104
105 M
106 M
107 M
108 M
109 M
110 M
111 M
112 M
113 M
114 M

PLATE 8

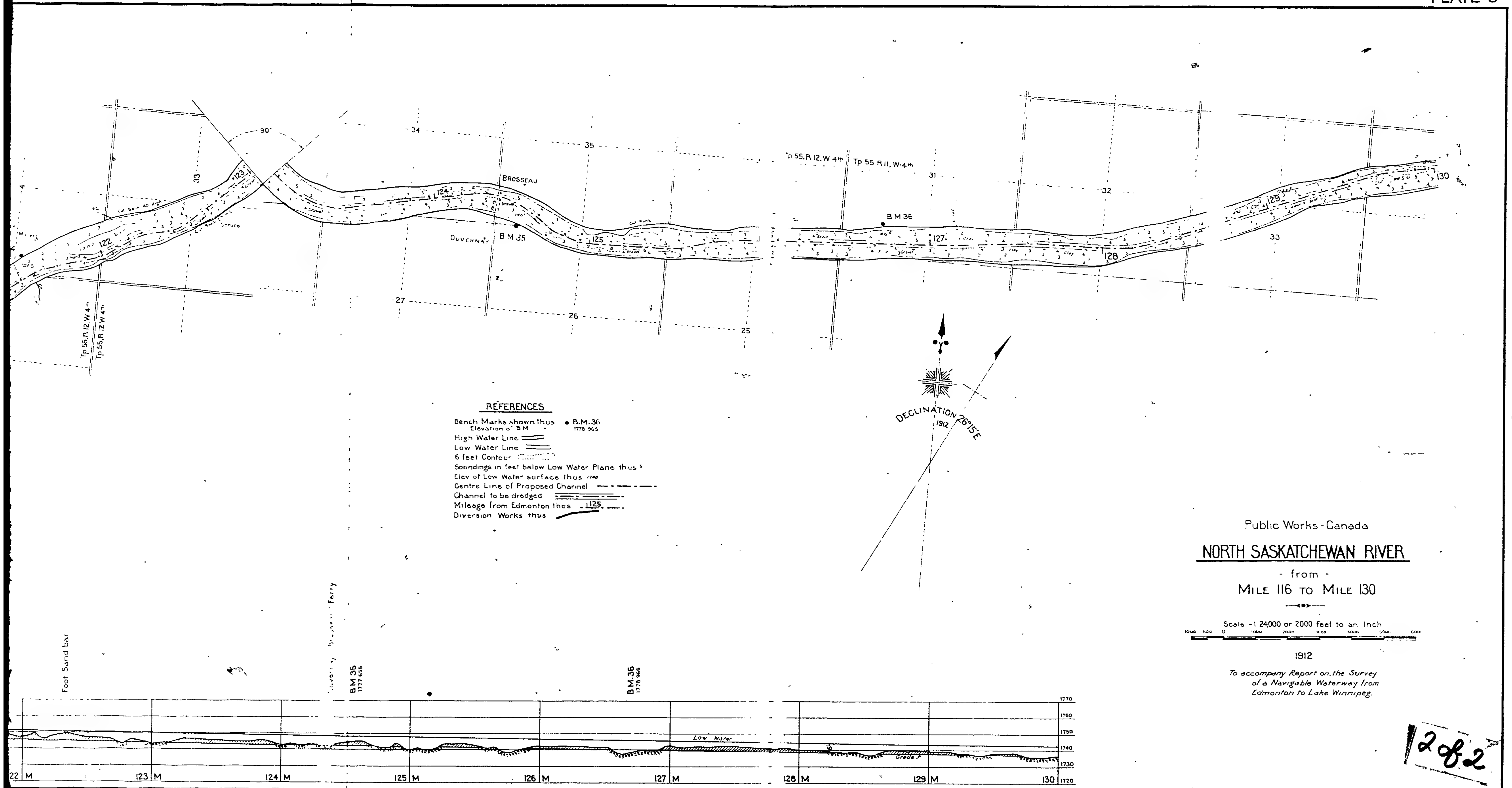


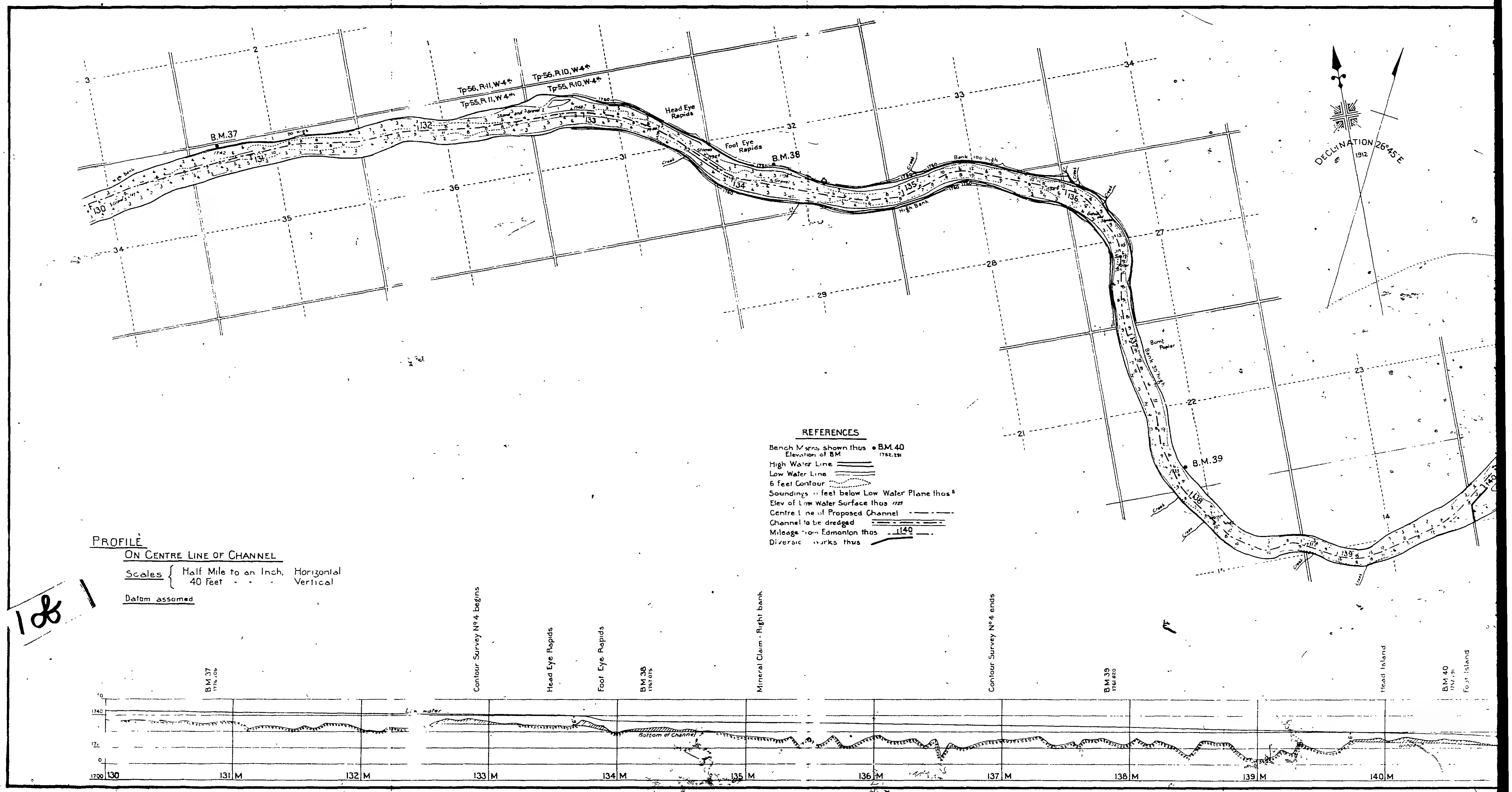
LITTLE HUNTER AND BLUE QUILL INDIAN RESERVE No 125
B.M 30
Stony Shore
Sandstone
Sandstone
Prairie
Creek
B.M 31
Tp 57, R 13, W 4th
Tp 57, R 12, W 4th
Small Rapid
Saddle Lake Cr
DECLINATION 26°30'E
1912
REFERENCES
Bench Marks shown thus • B.M.31 Elevation of B.M 1806.009
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1773
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 114
Sandstone outcrop both banks
Small Rapids
Saddle Lake Creek
E bdy Little Hunter and Blue Quill Ind Res
Tp 57, R 12, W 4th
Tp 56, R 12, W 4th
B.M 32
Low water
Grade
110 M
111 M
112 M
113 M
114 M
115 M
116
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 104 TO MILE 116
Scale 4000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
2 of 2



DECLINATION 26°15' E 1912
GOLD ISLAND
Cut Bank
B.M. 33
B.M. 34
B.M. 35
BROSSEAU
Tp 56 R 12 W 4 m
Tp 55 R 12 W 4 m
REFERENCES
Bench Marks shown thus
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 125
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales Half Mile to an Inch, Horizontal
40 Feet Vertical
Datum assumed
Head Island
Foot Island
Head Gold Island
Contour Survey No 3 ends
Foot Small Island
Foot Gold Island
Head Island
Foot Island
Head Sand bar
Foot Sand bar
Low Water
Bottom of Channel
116
117 M
118 M
119 M
120 M
121 M
122 M
123 M
124 M
125 M
126 M
108

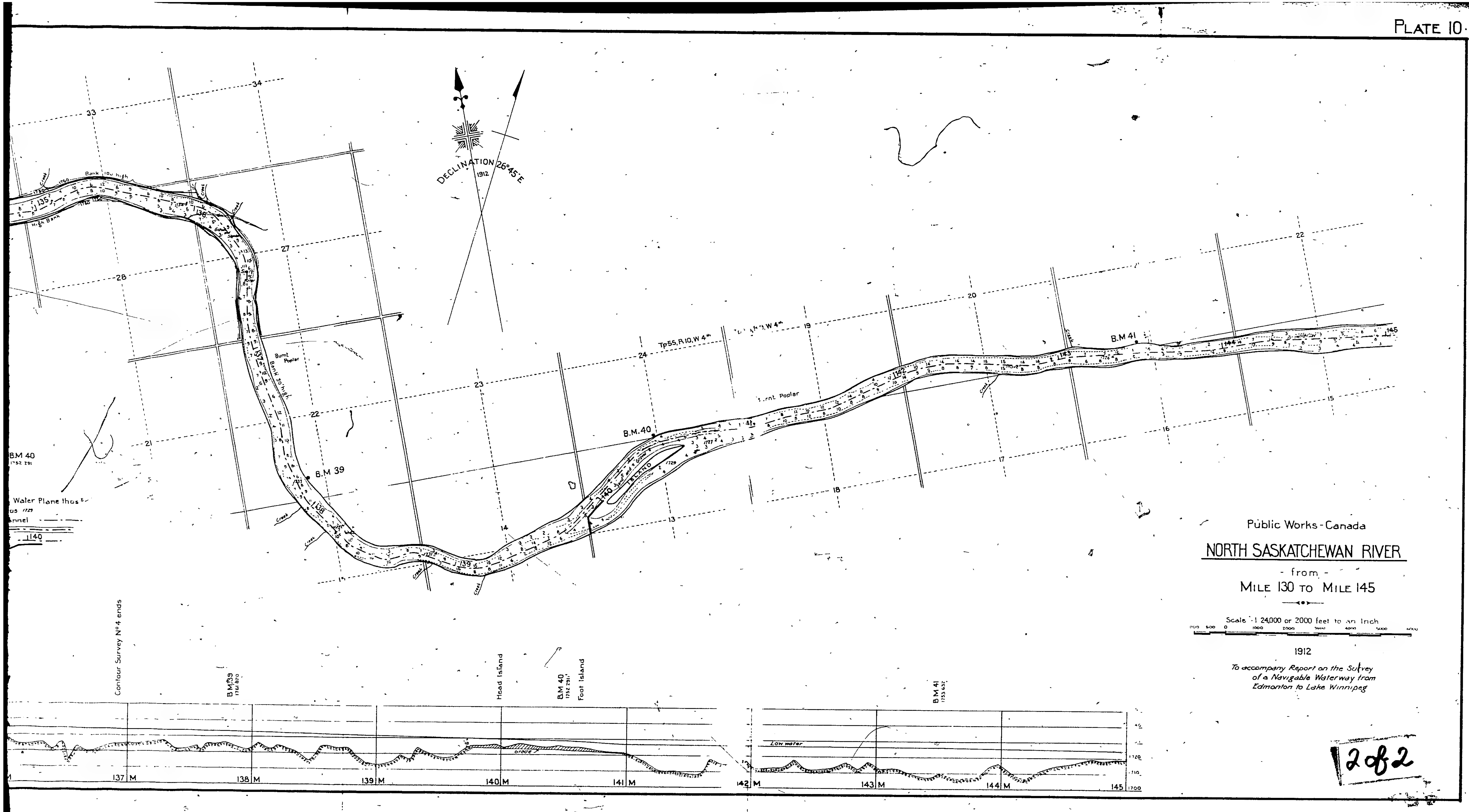
PLATE 9


REFERENCES
Bench Marks shown thus • B.M.36
Elevation of B.M. 1778.965
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 125
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 116 TO MILE 130
Scale -1:24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 26°15'E
1912
BROSSEAU
DUVERNAY
B M 35
B M 36
Tp 55, R 12, W 4th
Tp 55 R 11, W 4th
Tp 56, R 12, W 4th
Tp 55, R 12 W 4th
90°
Foot Sand bar
B.M 35
1777.655
B.M.36
1778.965
Low Water
2 of 2



Tp.56, R.11, W.4th
Tp.56, R.10, W.4th
Tp.55, R.11, W.4th
Tp.55, R.10, W.4th
B.M.37
B.M.38
B.M.39
Head Eye Rapids
Foot Eye Rapids
Bank 100 high
High Bank
Burnt Poplar
Bank 30 high
DECLINATION 26°45' E 1912
REFERENCES
Bench Marks shown thus • B.M.40
Elevation of BM 1752.291
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1729
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 140
Diversion works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet - - - Vertical
Datum assumed
B.M.37
Contour Survey No 4 begins
Head Eye Rapids
Foot Eye Rapids
B.M.38
Mineral Claim - Right bank
Contour Survey No 4 ends
B.M.39
Head Island
B.M.40
Foot Island
Low water
Bottom of Channel
1740
1700
130
131 M
132 M
133 M
134 M
135 M
136 M
137 M
138 M
139 M
140 M

108



Public Works - Canada

NORTH SASKATCHEWAN RIVER

- from -

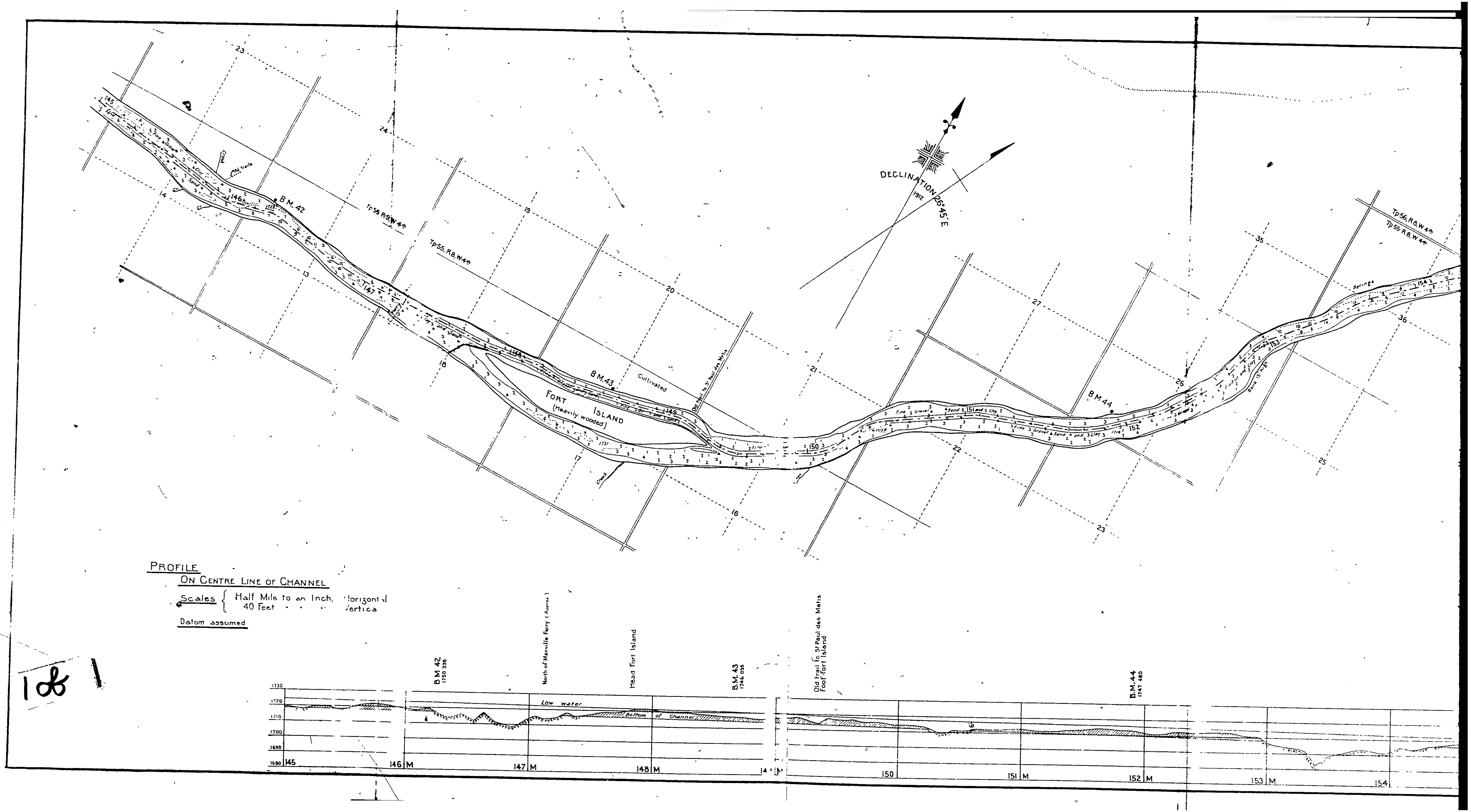
MILE 130 TO MILE 145

Scale 1:24,000 or 2000 feet to an Inch

1912

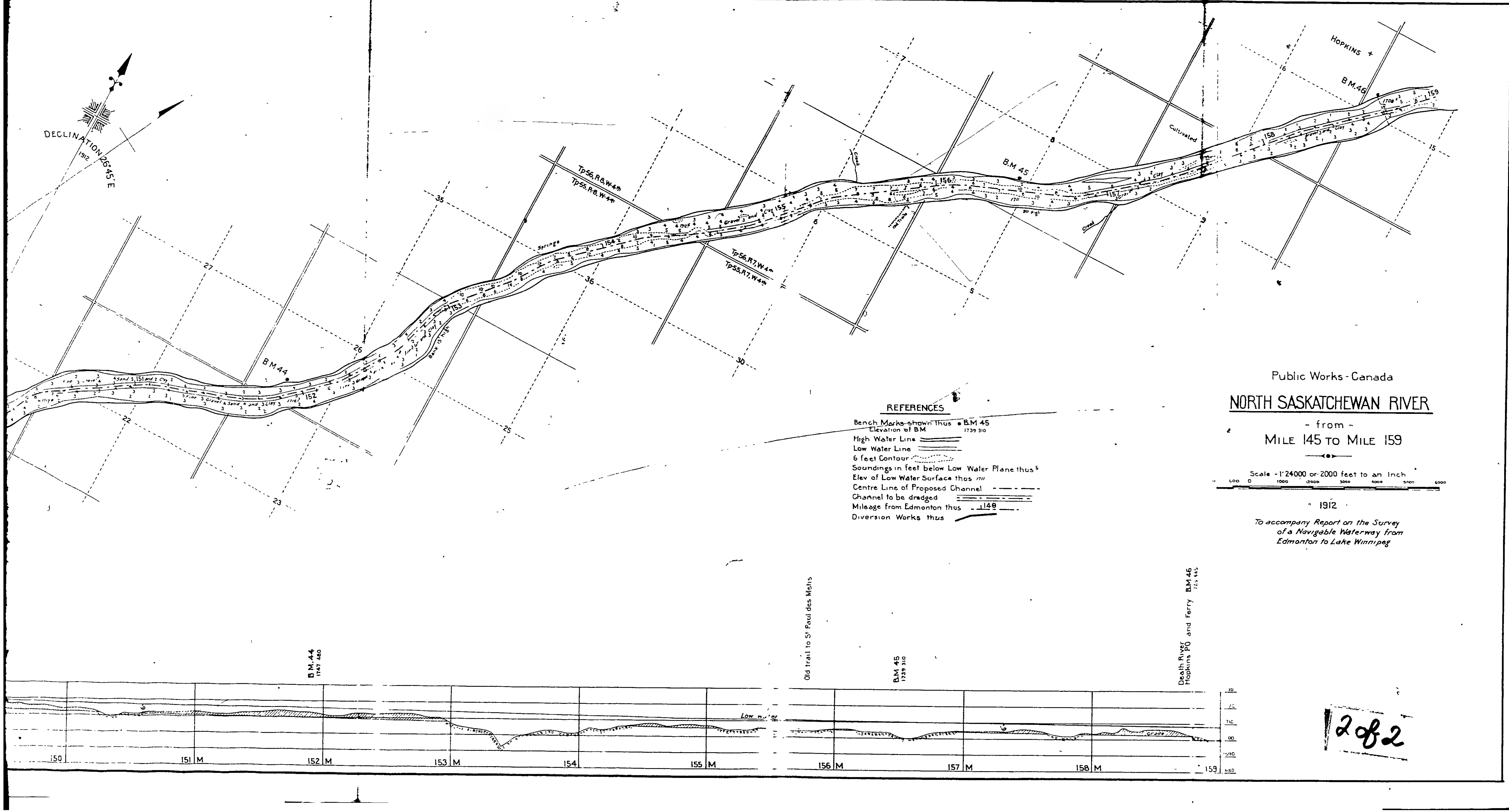
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg

2 of 2



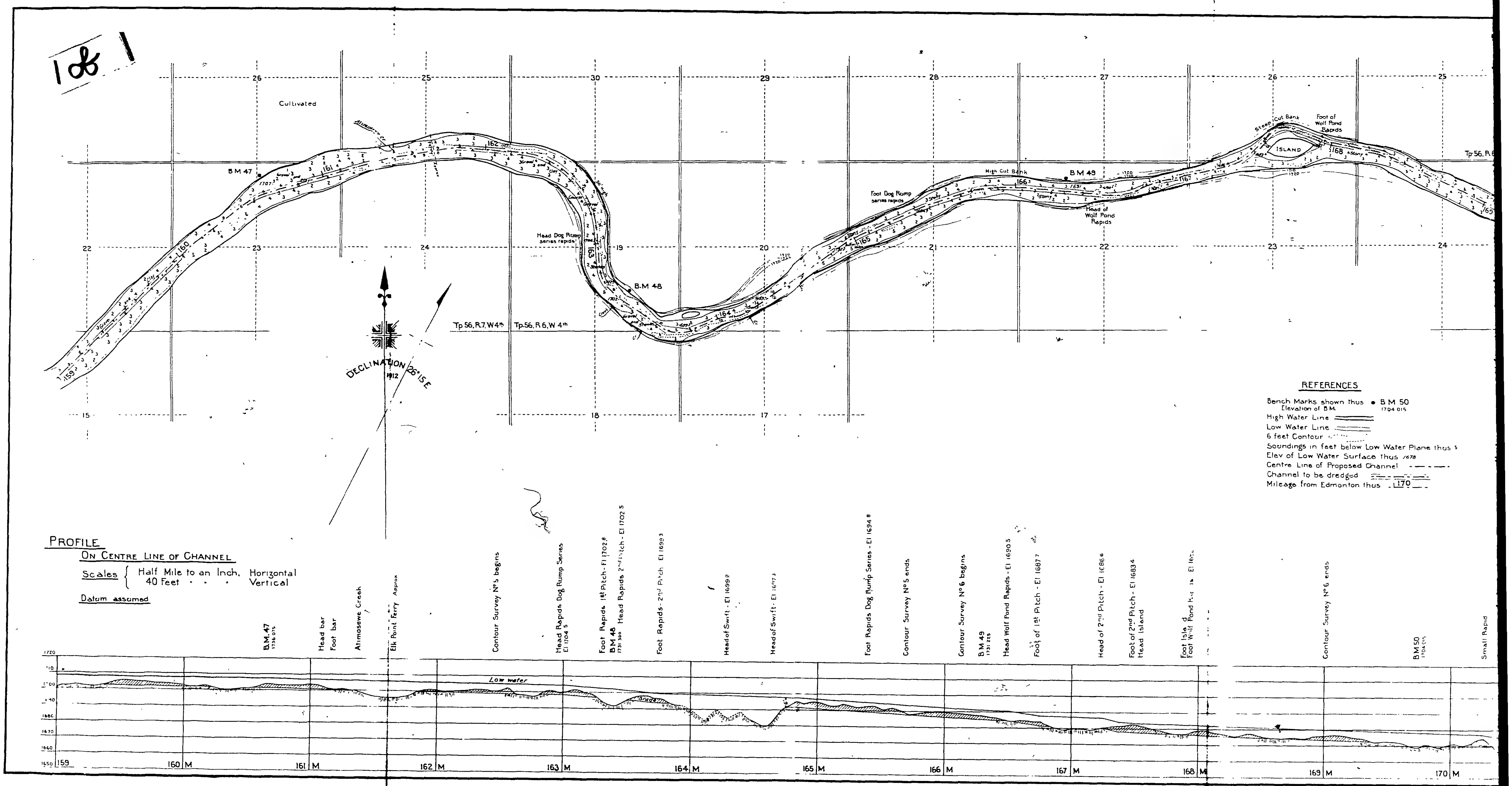
DECLINATION 26°45'E
1912
Tp.55 R.8 W.4th
Tp.56 R.8 W.4th
B.M. 42
B.M. 43
B.M. 44
FORT ISLAND
(Heavily wooded)
Cultivated
Springs
Creek
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet Vertical
Datum assumed
North of Manville Ferry (Approx.)
Head Fort Island
Old trail to St Paul des Metis
Foot Fort Island
Low water
Bottom of Channel

PLATE II

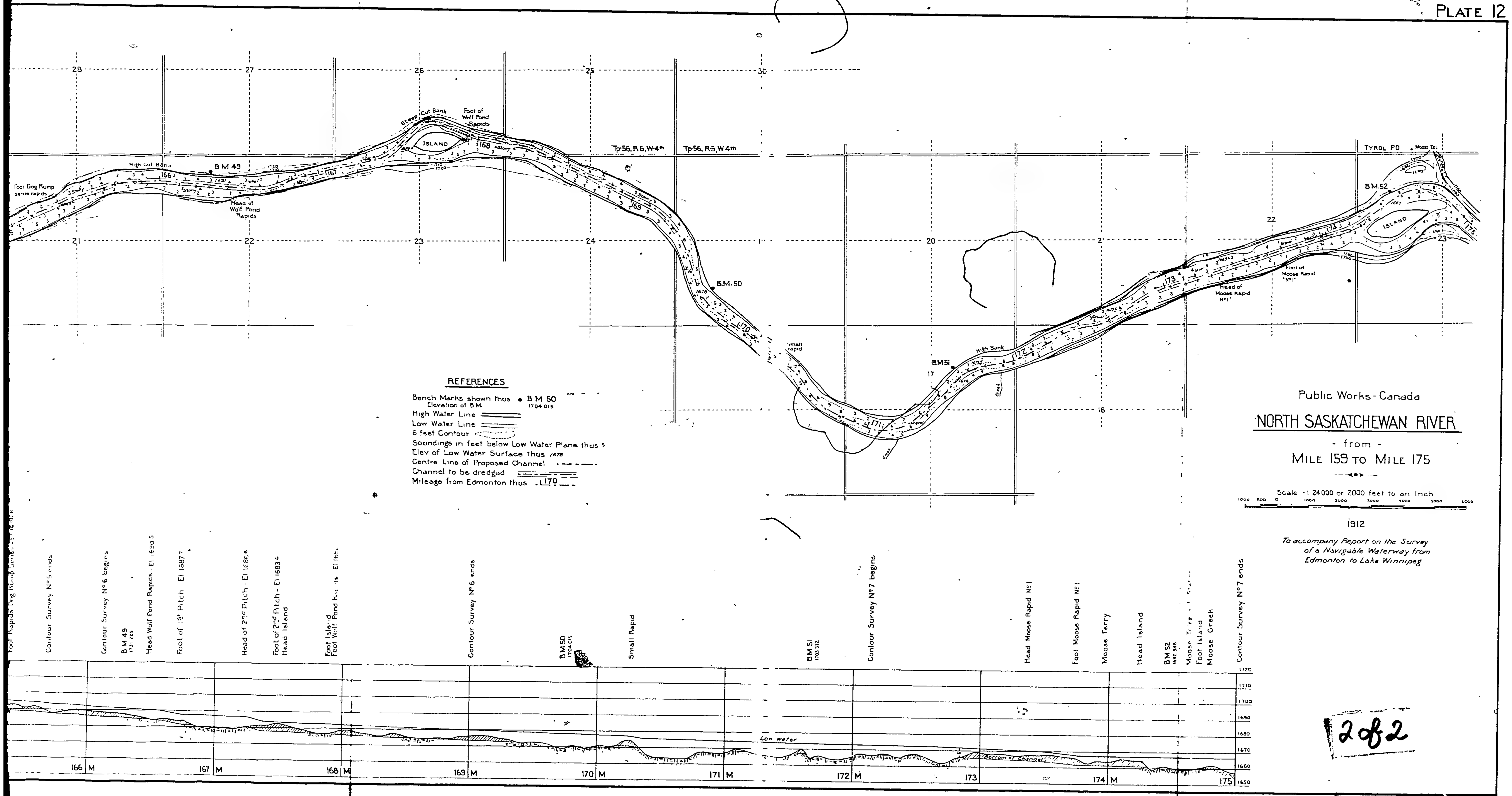


Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 145 TO MILE 159
Scale - 1:24000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B.M 45
Elevation of BM 1739 310
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1711
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 148
Diversion Works thus
DECLINATION 26°45'E
1912
HOPKINS
B.M.46
B.M 45
B.M 44
Tp.56, R.8, W.4th
Tp.55, R.8, W.4th
Tp.56, R.7, W.4th
Tp.55, R.7, W.4th
Cultivated
Springs
Creek
Old Trail
Old Trail to St Paul des Metis
Death River Hopkins PO and Ferry
Low water
Grade
150
151 M
152 M
153 M
154
155 M
156 M
157 M
158 M
159
2 of 2

108



Cultivated
B.M 47
B.M 48
B.M 49
Head Dog Rump series rapids
Foot Dog Rump series rapids
High Cut Bank
Head of Wolf Pond Rapids
Steep Cut Bank
Foot of Wolf Pond Rapids
ISLAND
Tp 56, R.7, W 4th
Tp 56, R 6, W 4th
DECLINATION 26° 15' E
1912
REFERENCES
Bench Marks shown thus • B M 50
Elevation of B.M. 1704 015
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1678
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 170
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M 47
Head bar
Foot bar
Atimosewe Creek
Elk Point Ferry Approx
Contour Survey Nº 5 begins
Head Rapids Dog Rump Series El 1704 5
Foot Rapids 1st Pitch - El 1702 8
B.M 48
Head Rapids 2nd Pitch - El 1702 5
Foot Rapids - 2nd Pitch El 1699 3
Head of Swift - El 1699 2
Foot Rapids Dog Rump Series - El 1694 8
Contour Survey Nº 5 ends
Contour Survey Nº 6 begins
B.M 49
Head Wolf Pond Rapids - El 1690 5
Foot of 1st Pitch - El 1687 7
Head of 2nd Pitch - El 1686
Foot of 2nd Pitch - El 1683 4
Head Island
Contour Survey Nº 6 ends
B.M 50
Small Rapid
Low water
Grade
1720
1710
1700
1690
1680
1670
1660
1650
159
160 M
161 M
162 M
163 M
164 M
165 M
166 M
167 M
168 M
169 M
170 M


Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 159 TO MILE 175
Scale - 1:24000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B M 50 1704.015
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1678
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 170
Tp.56, R.6, W.4th
Tp.56, R.5, W.4th
TYROL PO
Foot Dog Rump series rapids
High Cut Bank
B M 49
Head of Wolf Pond Rapids
Steep Cut Bank
Foot of Wolf Pond Rapids
ISLAND
B.M. 50
Small Rapid
BM 51
High Bank
BM 52
Head of Moose Rapid "No 1"
Foot of Moose Rapid "No 1"
Contour Survey No 5 ends
Contour Survey No 6 begins
Head Wolf Pond Rapids
Contour Survey No 6 ends
Contour Survey No 7 begins
Head Moose Rapid No 1
Foot Moose Rapid No 1
Moose Ferry
Head Island
Foot Island
Moose Creek
Contour Survey No 7 ends
Low water
Bottom of Channel
2 of 2

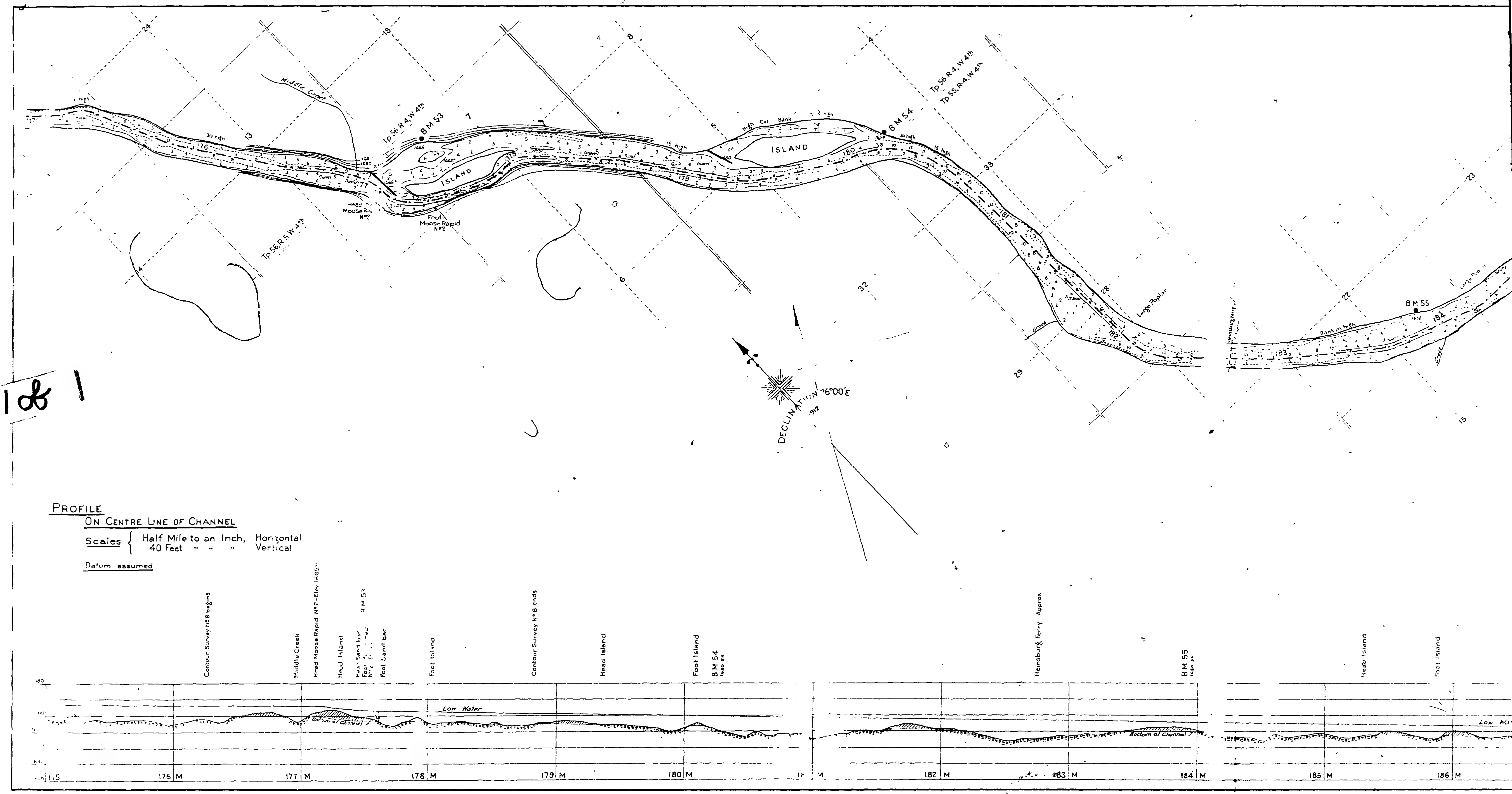
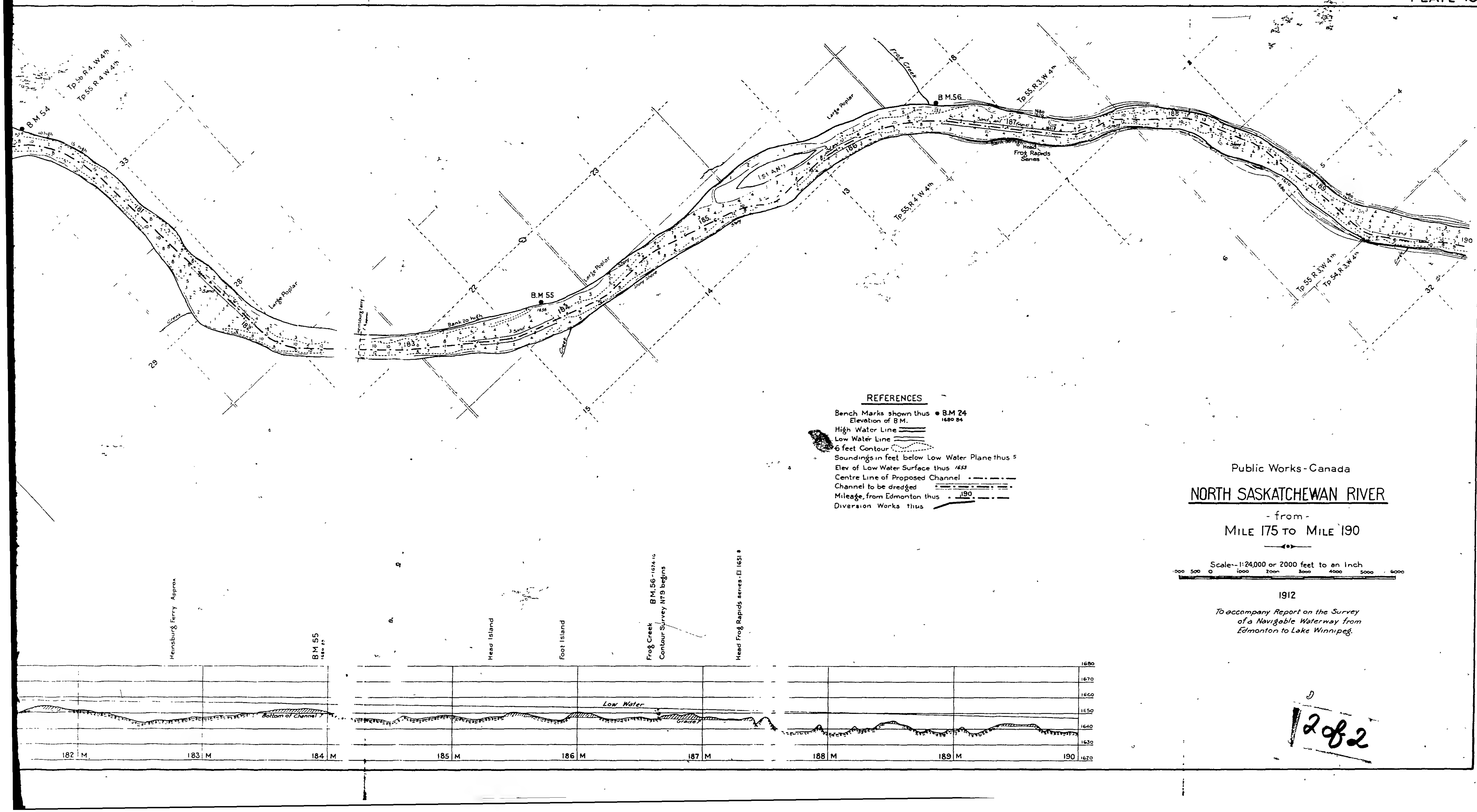
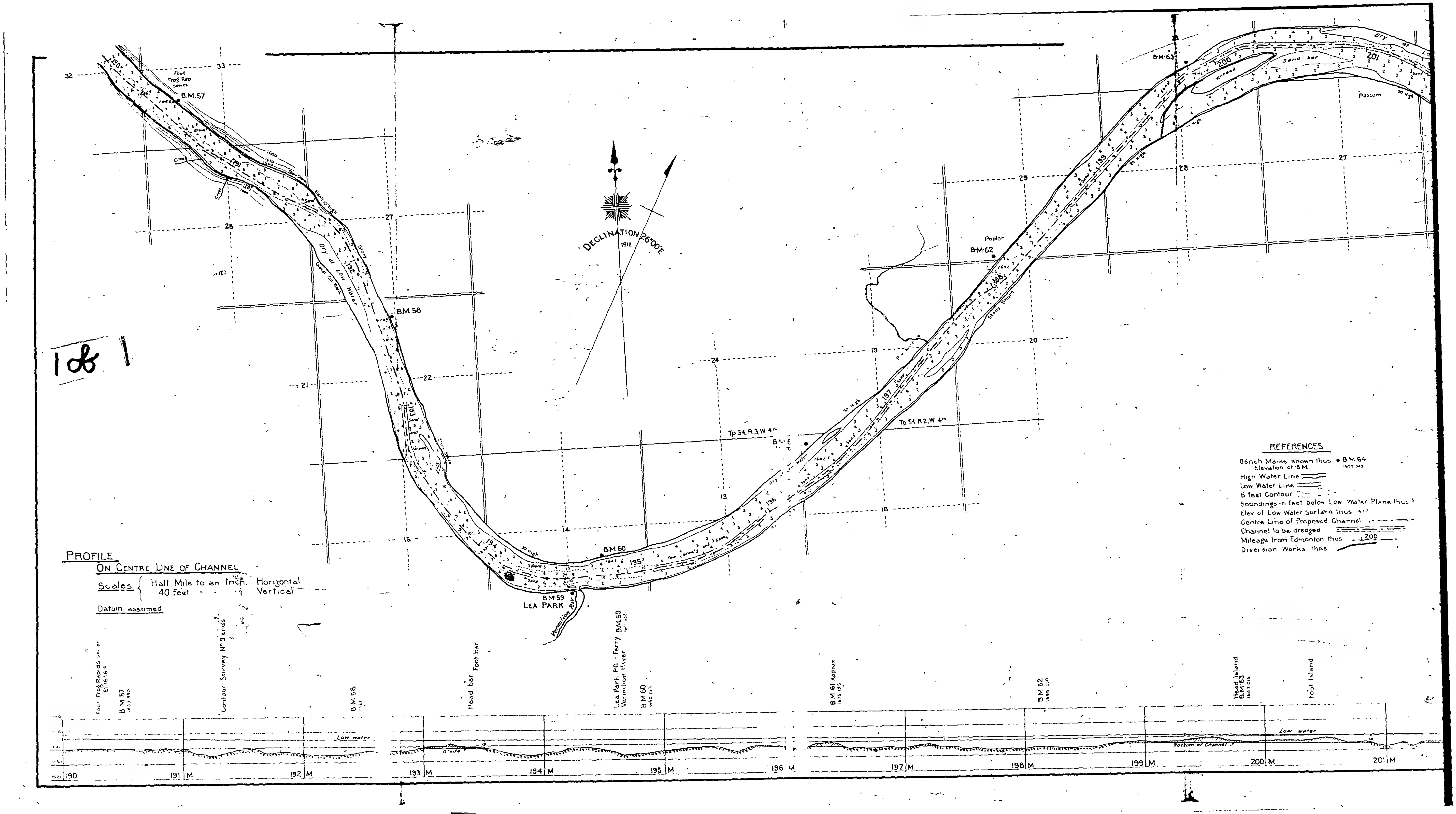

Middle Creek
Tp 56 R 4 W 4th
B M 53
ISLAND
Head Moose Rd. Nº2
Foot Moose Rapid Nº2
Tp 56 R 5 W 4th
High Cut Bank
ISLAND
B M 54
Tp 56 R 4 W 4th
Tp 55 R 4 W 4th
Large Poplar
B M 55
DECLINATION 26°00'E
1912
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Contour Survey Nº8 begins
Middle Creek
Head Moose Rapid Nº2 - Elev 1665
Head Island
Foot Island
Contour Survey Nº8 ends
Head Island
Foot Island
B M 54
Heinsburg Ferry Approx
B M 55
Head Island
Foot Island
Low Water
Bottom of Channel
176 M
177 M
178 M
179 M
180 M
182 M
183 M
184 M
185 M
186 M
1ⅆ 1

PLATE 13

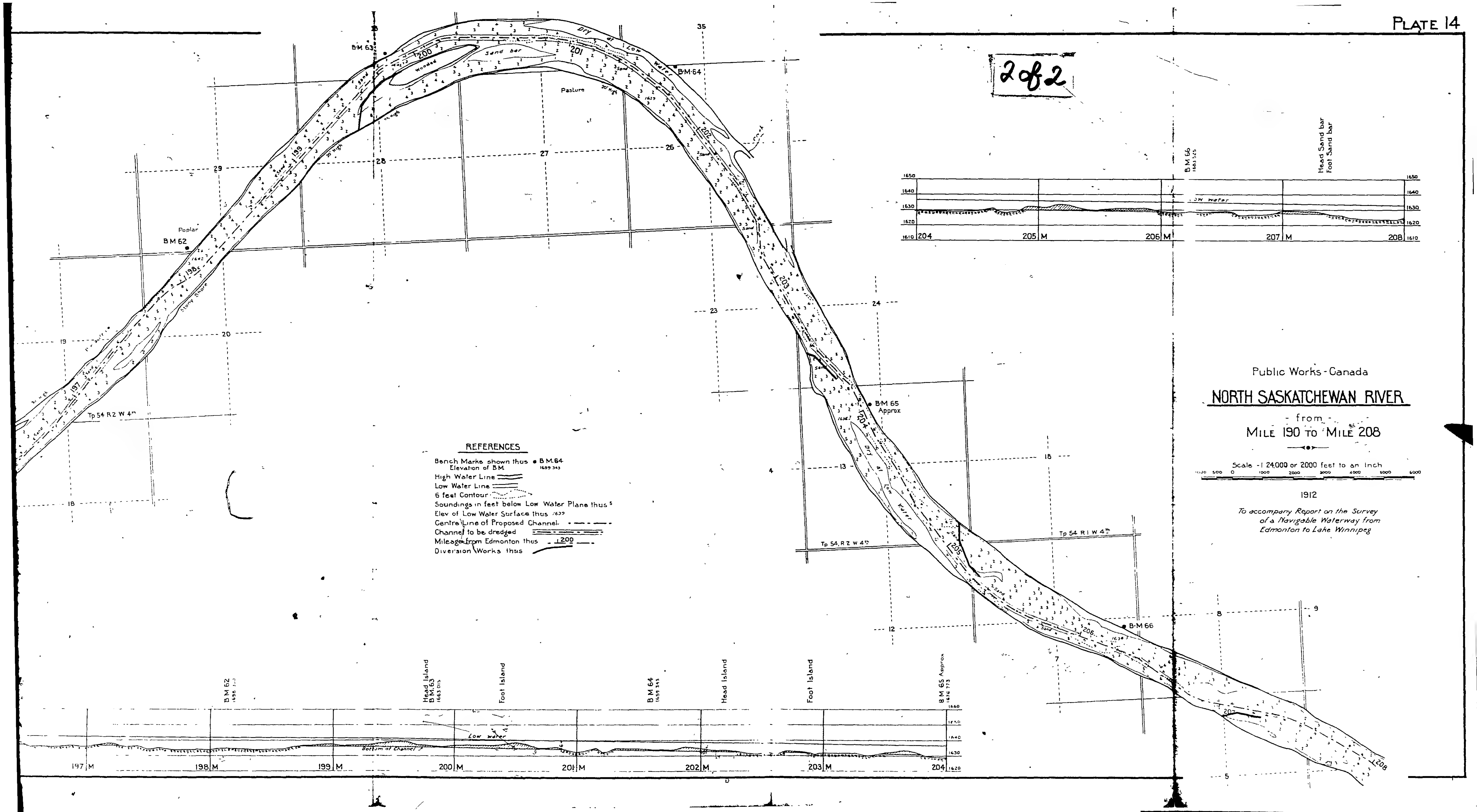

REFERENCES
Bench Marks shown thus ● B.M 24 1680 84
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1653
Centre Line of Proposed Channel
Channel to be dredged
Mileage, from Edmonton thus 190
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 175 TO MILE 190
Scale - 1:24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
B.M 54
B.M 55
B.M.56
Tp 56 R 4 W 4th
Tp 55 R 4 W 4th
Tp 55 R 3 W 4th
Tp 54 R 3 W 4th
Large Poplar
Heinsburg Ferry
Bank 20 high
Island
Frog Creek
Head Frog Rapids Series
Creek
Heinsburg Ferry Approx
Head Island
Foot Island
Frog Creek
B.M.56 - 1674.16
Contour Survey Nº 9 begins
Head Frog Rapids series - El 1651
Low Water
Bottom of Channel
Grade
182 M
183 M
184 M
185 M
186 M
187 M
188 M
189 M
190
2 of 2



DECLINATION 26°00'E
1912
B.M. 57
B.M. 58
B.M. 59
LEA PARK
B.M. 60
B.M. 62
B.M. 63
Poplar
Dry at Low Water
Stony Shore
Sand bar
Pasture
Tp 54, R 3, W 4th
Tp 54 R 2, W 4th
REFERENCES
Bench Marks shown thus
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales
Half Mile to an Inch. Horizontal
40 Feet Vertical
Datum assumed
Foot Frog Rapids series
Contour Survey Nº 9 ends
Head bar
Foot bar
Lea Park P.O. - Ferry
Vermilion River
Head Island
Foot Island
Low water
Bottom of Channel
190
191 M
192 M
193 M
194 M
195 M
196 M
197 M
198 M
199 M
200 M
201 M

PLATE 14

2 of 2



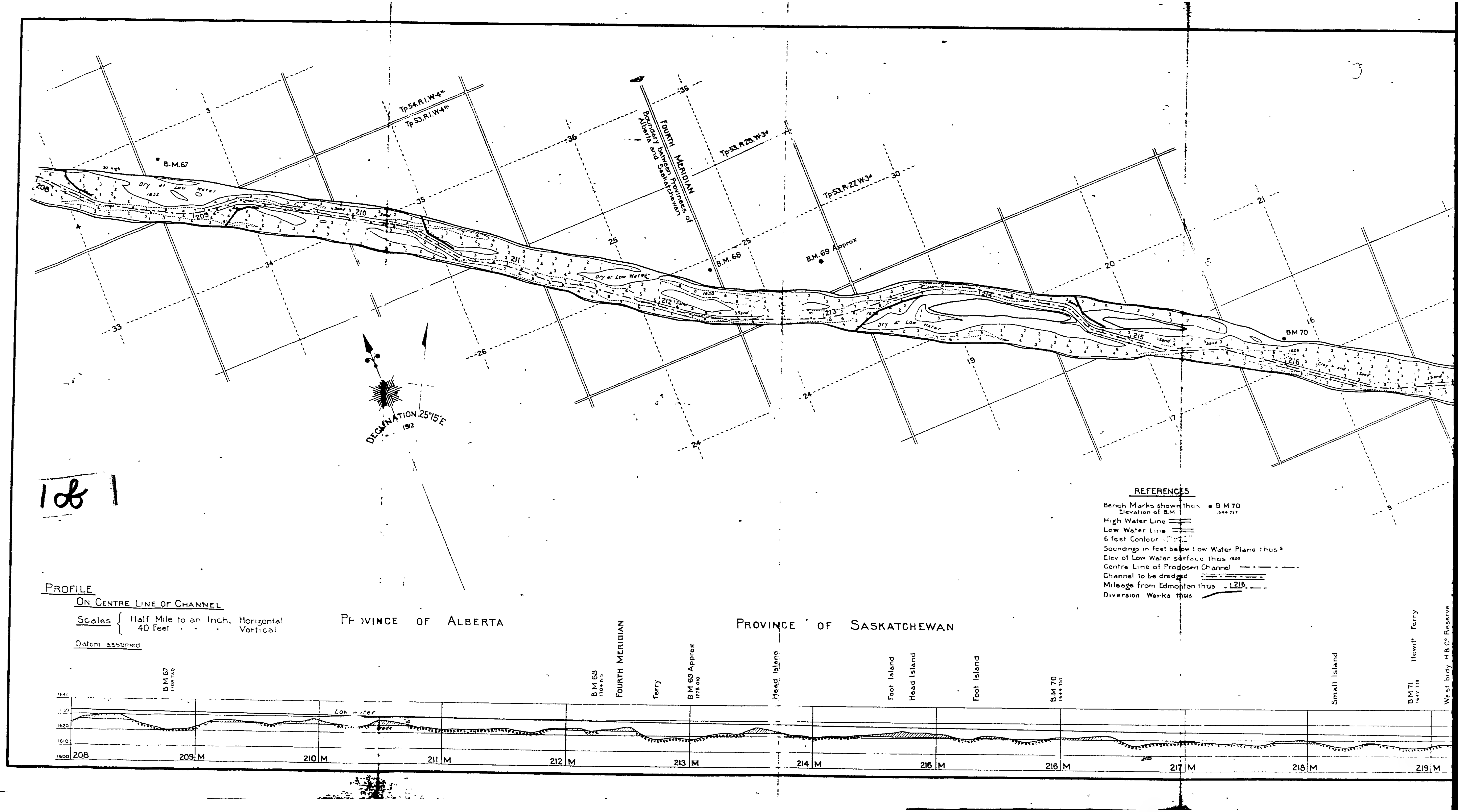
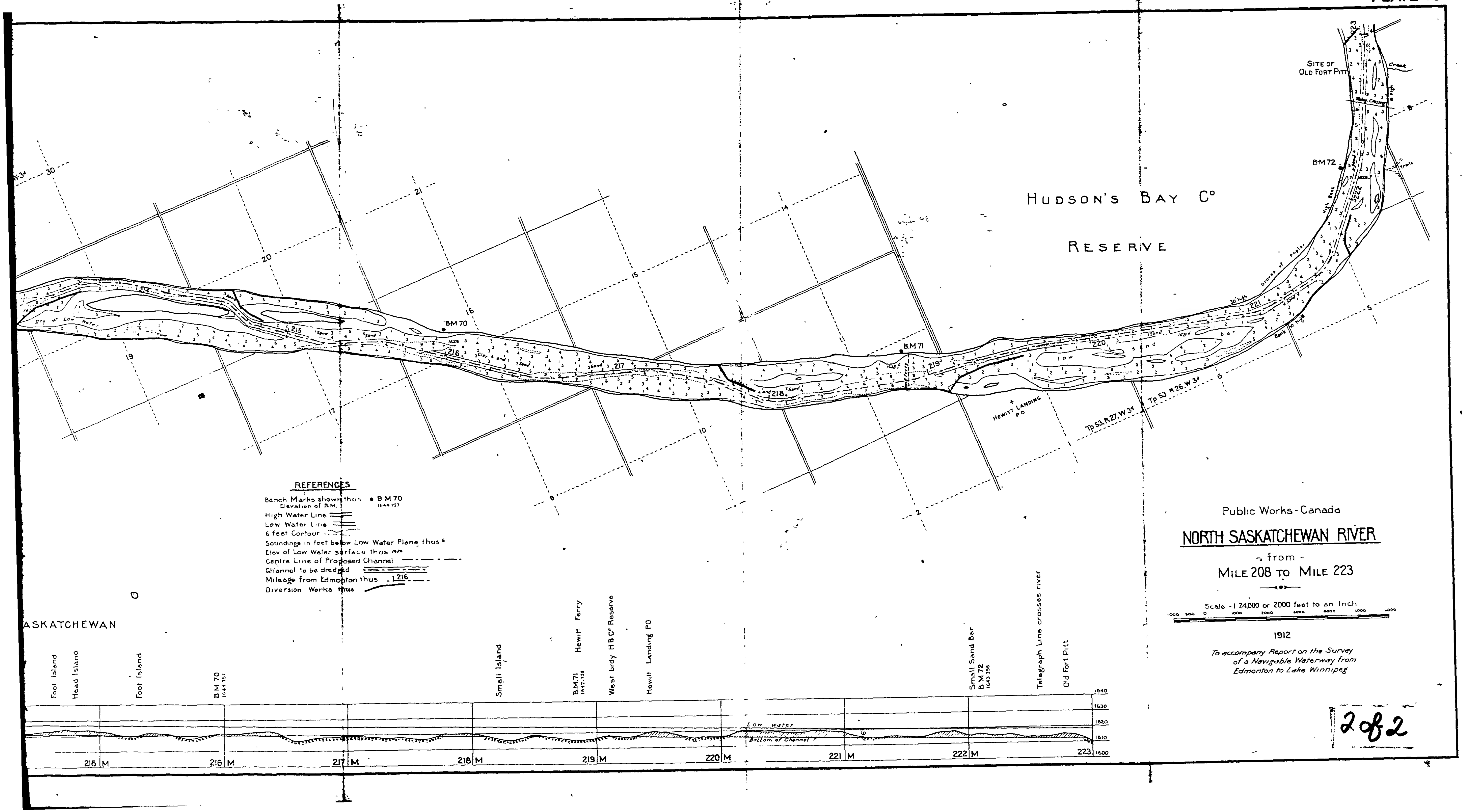
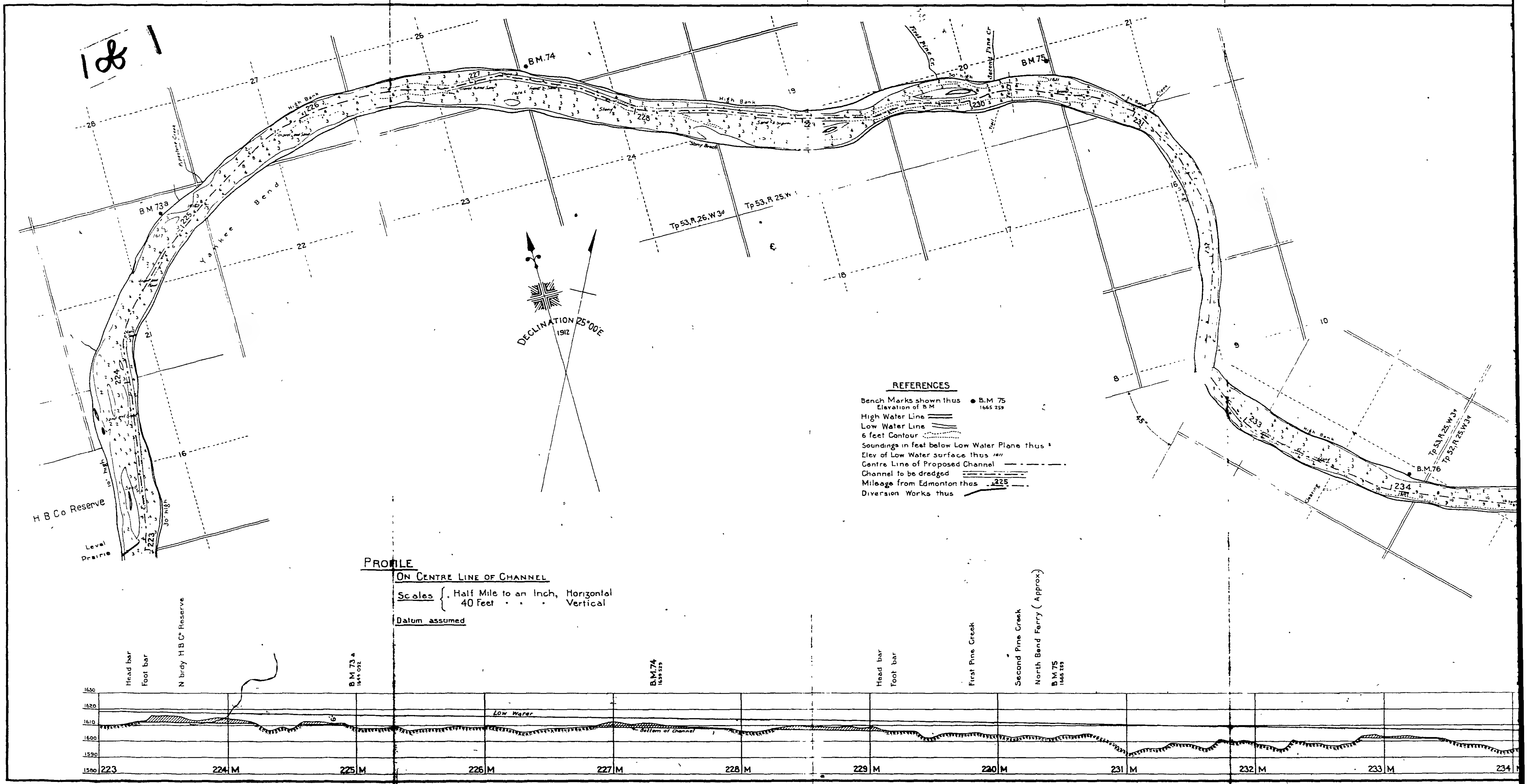

Tp 54. R 1. W 4th
Tp 53. R 1. W 4th
FOURTH MERIDIAN
Boundary between Provinces of Alberta and Saskatchewan
Tp 53. R 28. W 3rd
Tp 53. R 27. W 3rd
B.M. 67
B.M. 68
B.M. 69 Approx
BM 70
Dry at Low Water
DECLINATION 25°15' E
1912
REFERENCES
Bench Marks shown thus • B M 70
Elevation of B.M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 216
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet Vertical
Datum assumed
PROVINCE OF ALBERTA
PROVINCE OF SASKATCHEWAN
B M 67
B M 68
FOURTH MERIDIAN
Ferry
B M 69 Approx
Head Island
Foot Island
Head Island
Foot Island
B M 70
Small Island
B M 71
Hewitt Ferry
West bdy H B Co Reserve
Low water
208
209 M
210 M
211 M
212 M
213 M
214 M
215 M
216 M
217 M
218 M
219 M

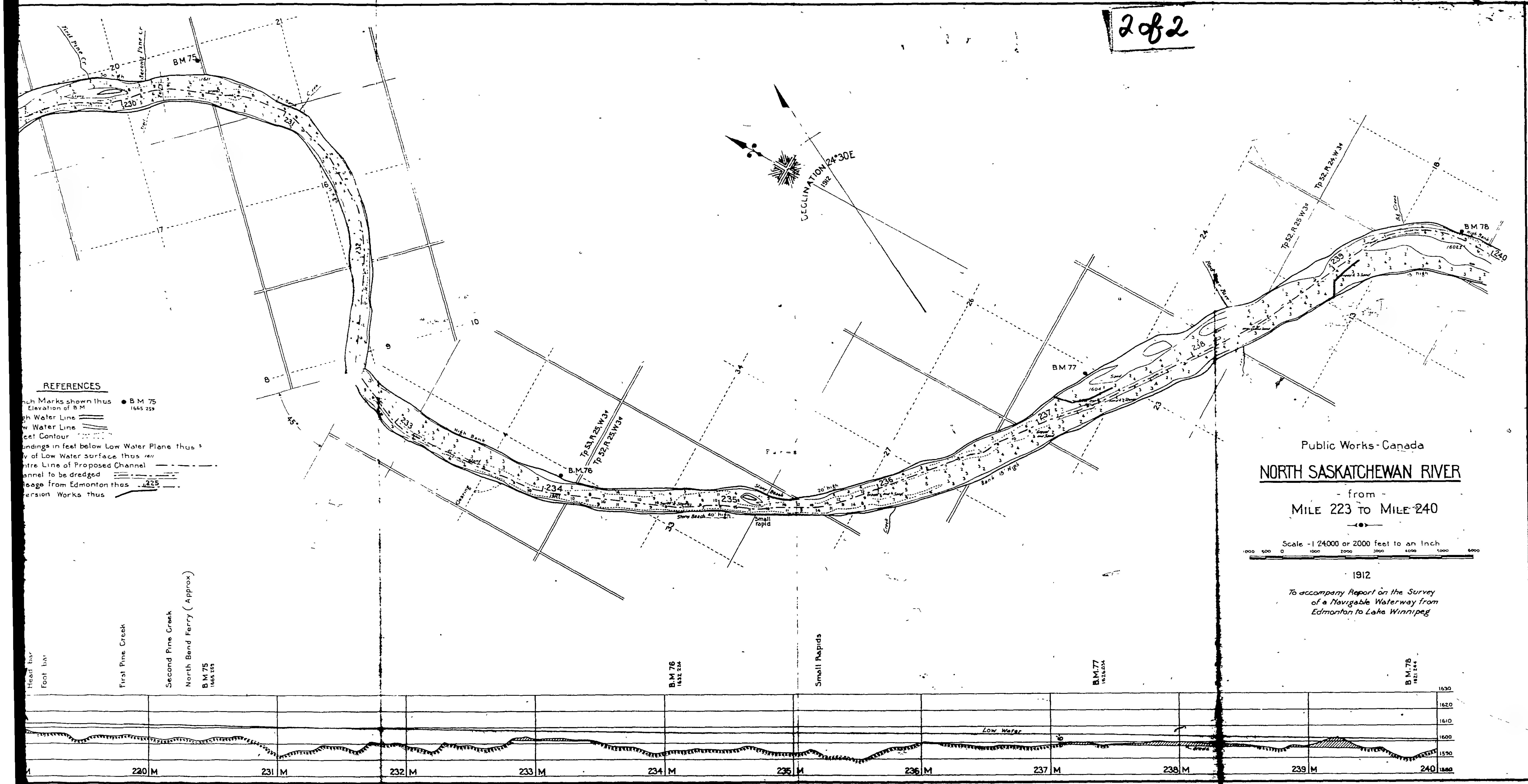
PLATE 15



HUDSON'S BAY Co
RESERVE
SITE OF OLD FORT PITT
B.M 70
B.M 71
B.M 72
HEWITT LANDING P.O.
Tp 53 R 27 W 3d
Tp 53 R 26 W 3d
REFERENCES
Bench Marks shown thus • B M 70 1644.757
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 6
Elev of Low Water surface thus 1626
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 216
Diversion Works thus
SASKATCHEWAN
Foot Island
Head Island
Foot Island
B M 70
Small Island
B.M 71
Hewitt Ferry
West brdy H B Co Reserve
Hewitt Landing PO
Small Sand Bar
B M 72
Telegraph Line crosses river
Old Fort Pitt
Low water
Bottom of Channel
215 M
216 M
217 M
218 M
219 M
220 M
221 M
222 M
223
1640
1630
1620
1610
1600
Public Works - Canada
NORTH SASKATCHEWAN RIVER
from
MILE 208 TO MILE 223
Scale - 1 24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
2 of 2


18 1
BM 73a
B.M.74
BM 75
B.M.76
H B Co Reserve
Level Prairie
Yankee Bend
High Bank
Pipestone Creek
Stony Beach
First Pine Cr
Second Pine Cr
Tp 53, R 26, W 3d
Tp 53, R 25, W
Tp 53, R 25, W 3d
Tp 52, R 25, W 3d
DECLINATION 25°00'E
1912
REFERENCES
Bench Marks shown thus • B.M 75 1665 259
Elevation of B M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus 1611
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 225
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet . . . Vertical
Datum assumed
Head bar
Foot bar
N brdy H B C° Reserve
B.M. 73 a 1649 092
B.M.74 1639 529
First Pine Creek
Second Pine Creek
North Bend Ferry (Approx)
B.M 75 1665 259
Low Water
Bottom of Channel
223
224 M
225 M
226 M
227 M
228 M
229 M
230 M
231 M
232 M
233 M
234 M

2 of 2



Public Works - Canada

NORTH SASKATCHEWAN RIVER

- from -

MILE 223 TO MILE 240

Scale - 1:24000 or 2000 feet to an Inch

1912

To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg

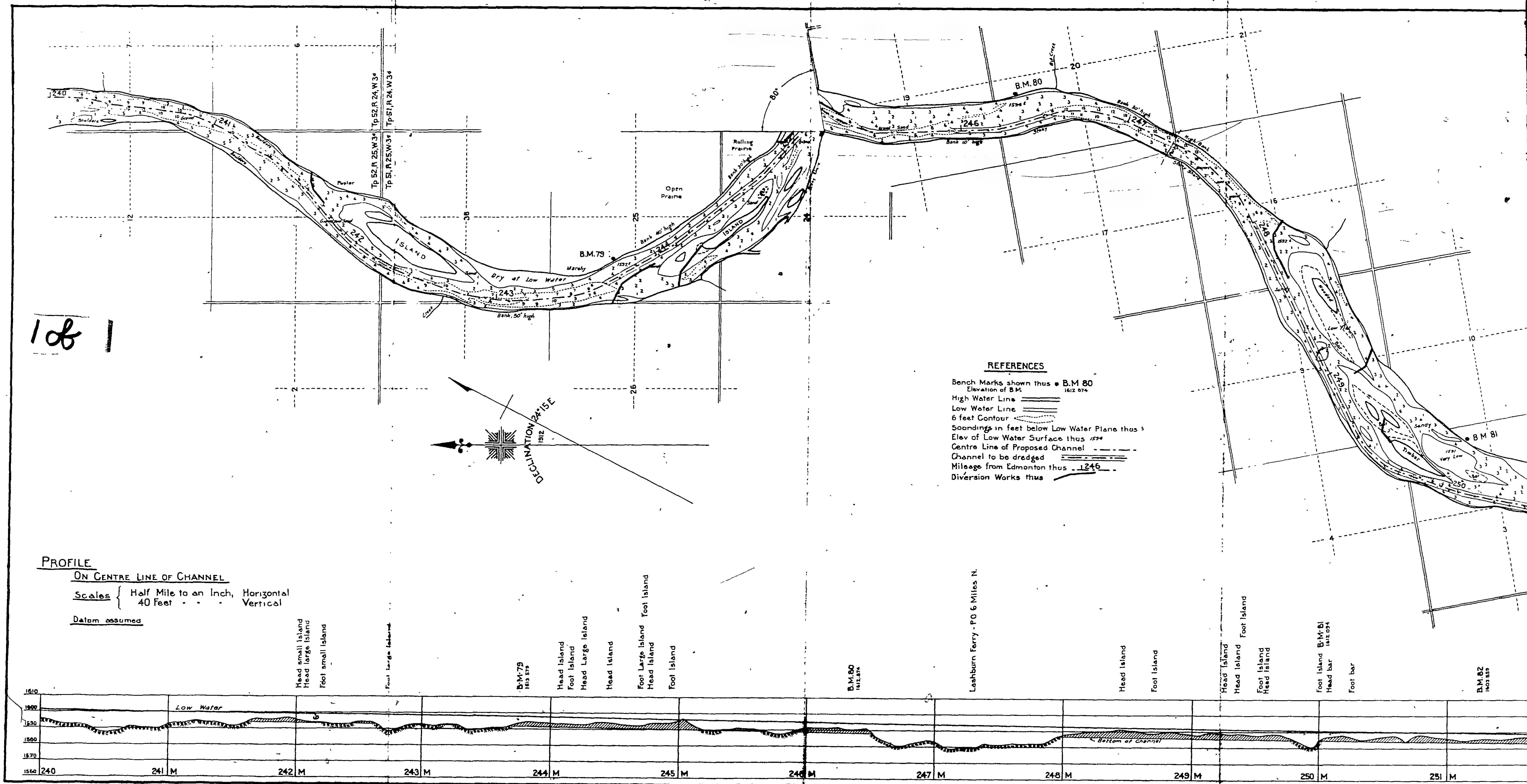
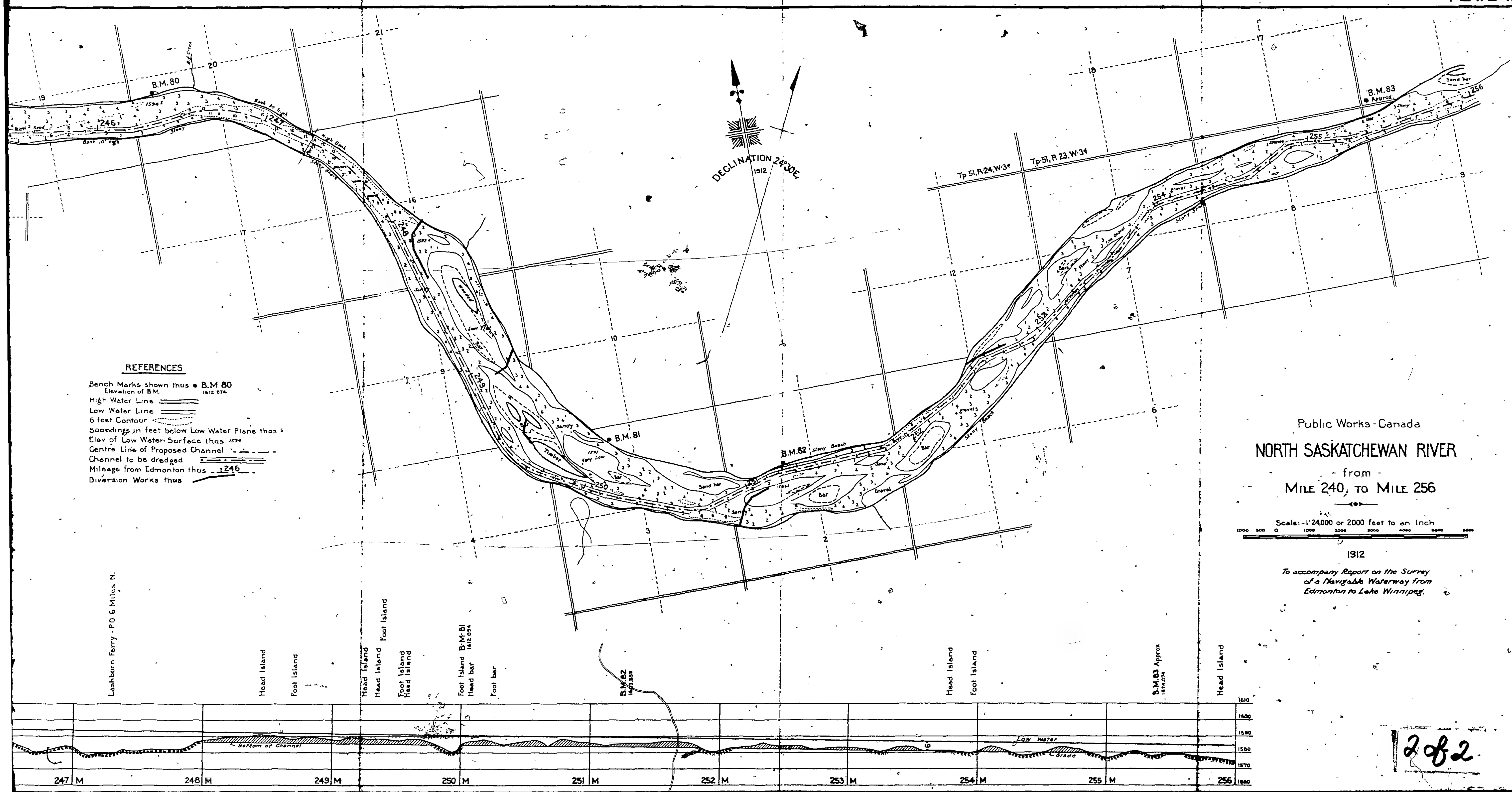

1 of 1
Tp 52, R 24, W 3rd
Tp 52, R 25, W 3rd
Tp 51, R 25, W 3rd
Tp 51, R 24, W 3rd
ISLAND
Dry at Low Water
Bank, 50' high
Rolling Prairie
Open Prairie
Poplar
Marshy
Creek
B.M. 79
B.M. 80
B.M 81
DECLINATION 24°15'E 1912
REFERENCES
Bench Marks shown thus • B.M 80
Elevation of B.M. 1612.874
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1594
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 1246
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal; 40 Feet - - - Vertical
Datum assumed
Low Water
Bottom of Channel
Head small Island
Head large Island
Foot small Island
Foot Large Island
B.M. 79
Head Island
Foot Island
Head Large Island
Head Island
Foot Large Island
Head Island
Foot Island
Foot Island
B.M. 80
Lashburn Ferry - PO 6 Miles N.
Head Island
Foot Island
Head Island
Head Island
Foot Island
Foot Island
Head Island
Foot Island B.M. 81
Head bar
Foot bar
B.M. 82
240
241 M
242 M
243 M
244 M
245 M
246 M
247 M
248 M
249 M
250 M
251 M

PLATE 17



Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 240, TO MILE 256
Scale:- 1" 24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B.M 80
Elevation of B.M. 1612.074
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1534
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 246
Diversion Works thus
DECLINATION 24°30'E.
1912
Tp 51, R 24, W 3rd
Tp 51, R 23, W 3rd
B.M. 80
B.M. 81
B.M. 82
B.M. 83
Approx
Sand bar
Stony Beach
Gravel
Bar
High Bank
Sandy
Timber
Very Low
Low Flat
Stony
Bank 10' high
Bank 30' high
Lashburn Ferry - P.O 6 Miles N.
Head Island
Foot Island
Head bar
Foot bar
Low Water
Bottom of Channel
Grade
247 M
248 M
249 M
250 M
251 M
252 M
253 M
254 M
255 M
256
2 of 2

1 of 1

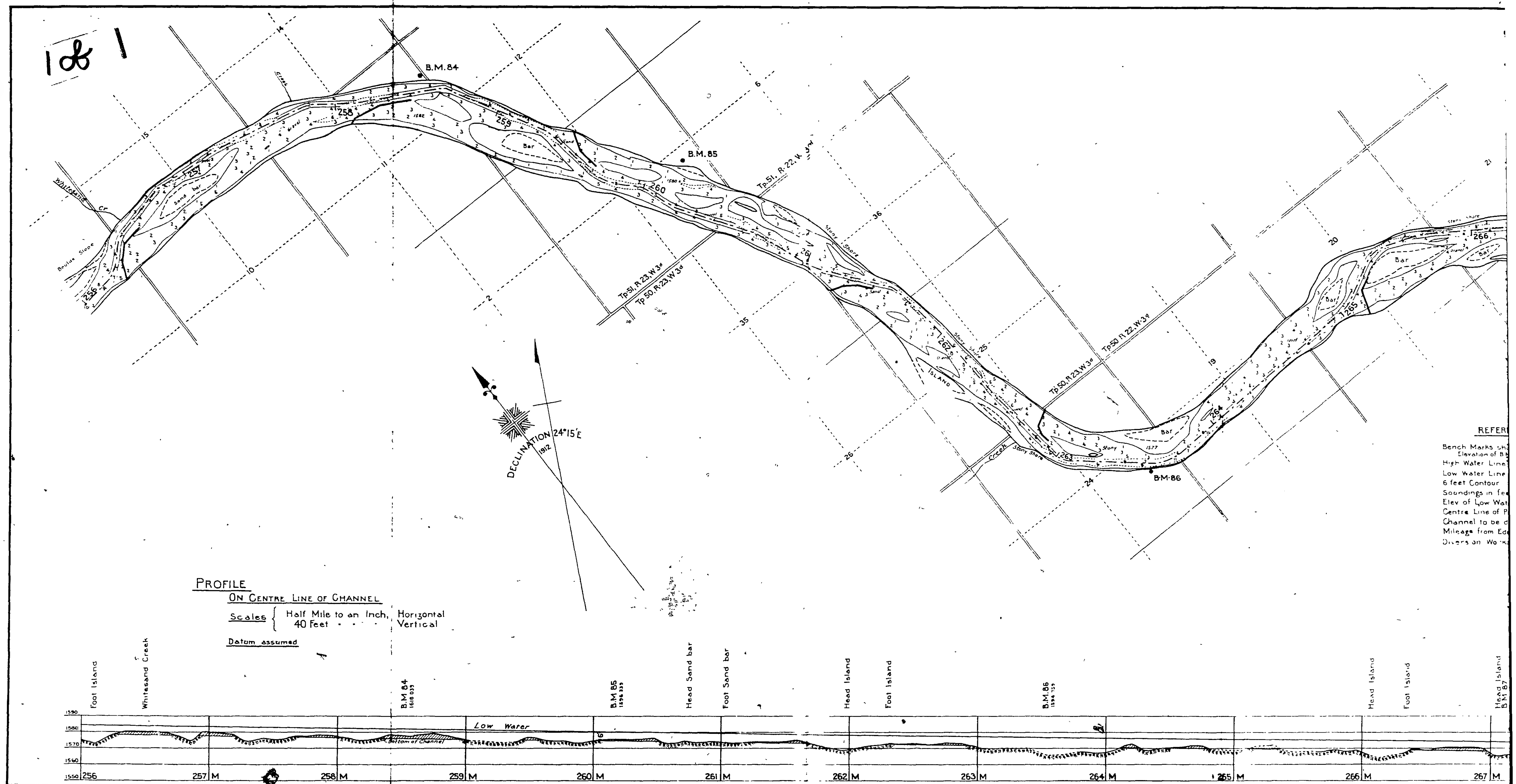
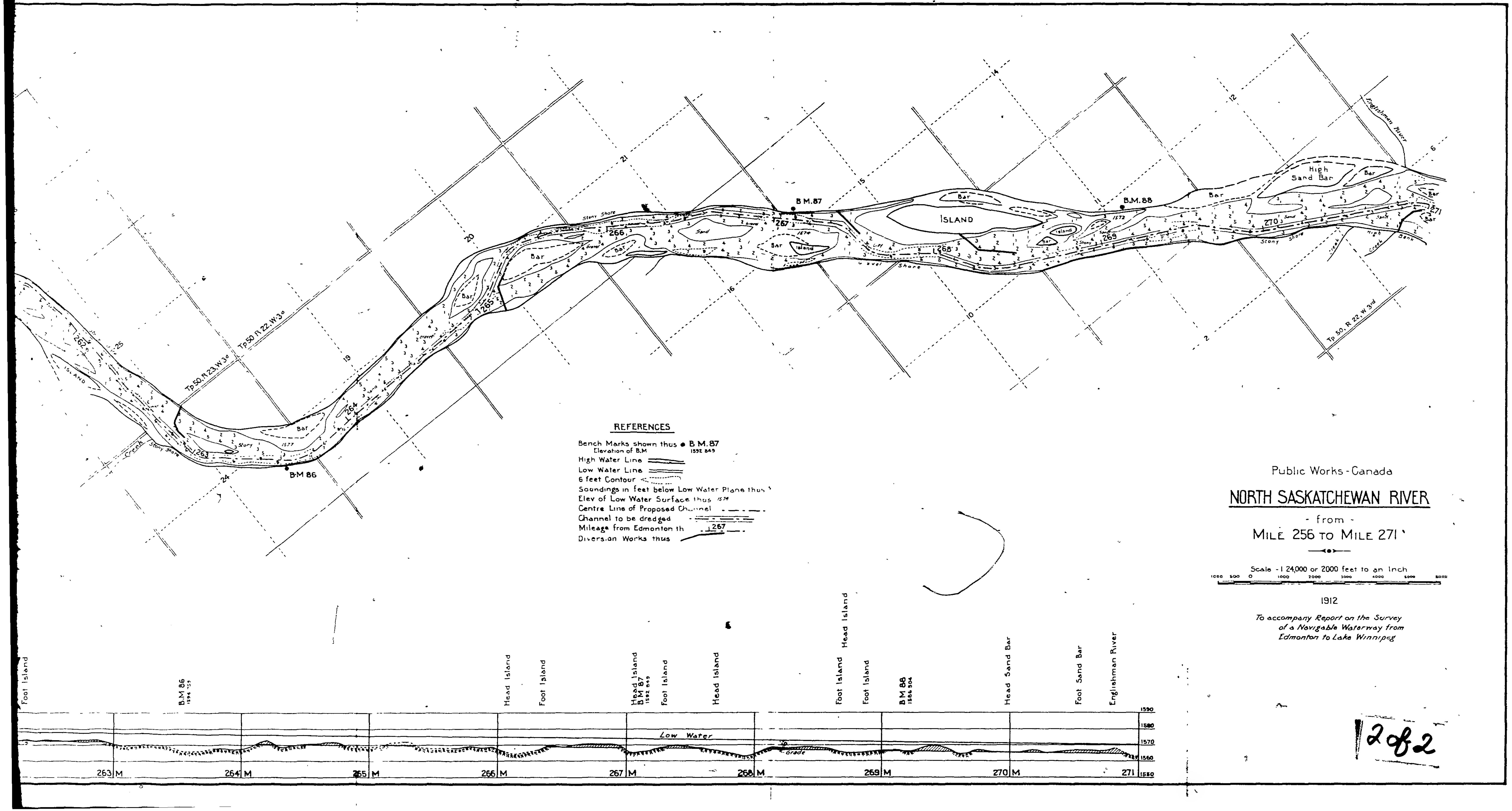
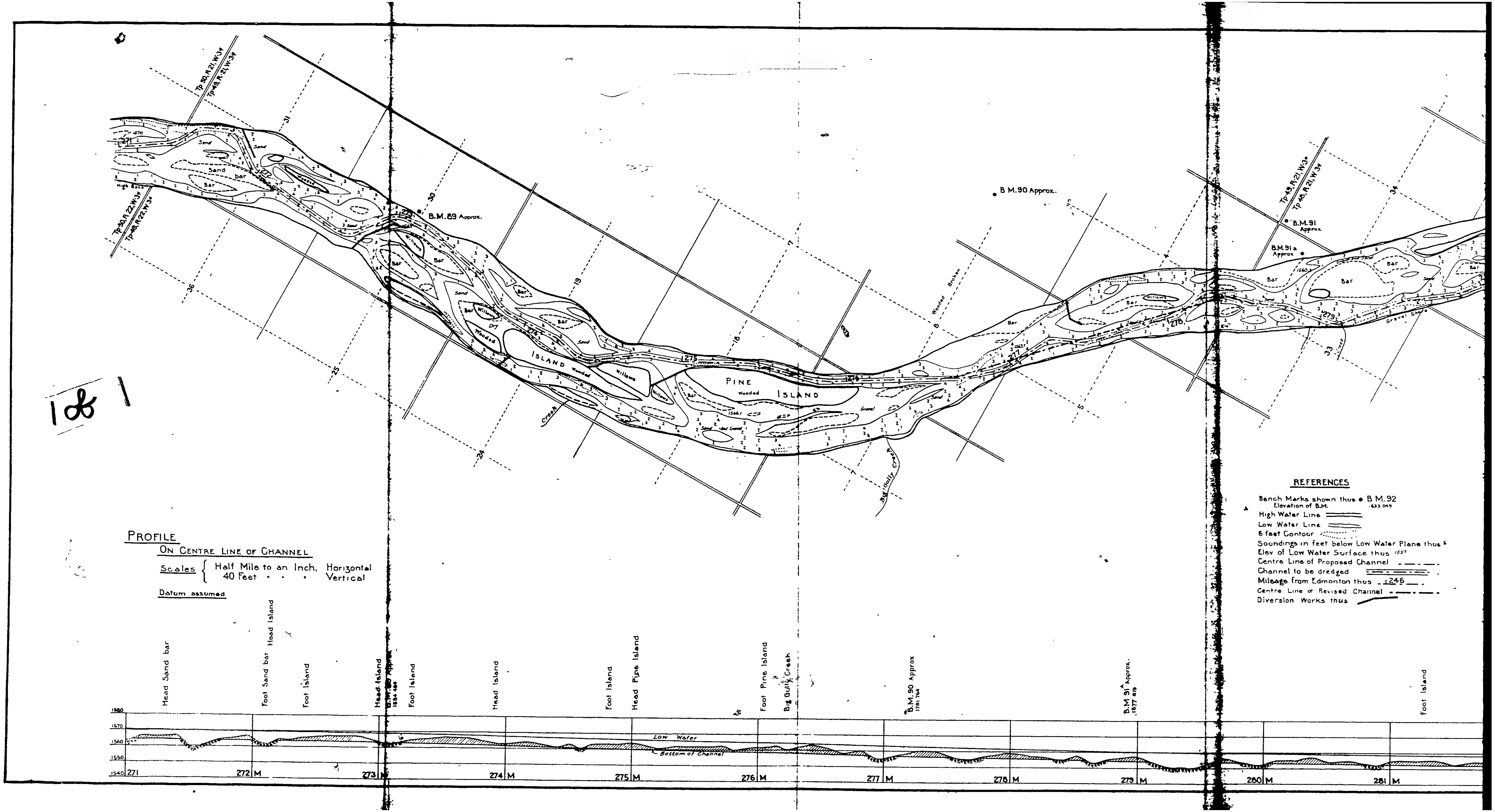
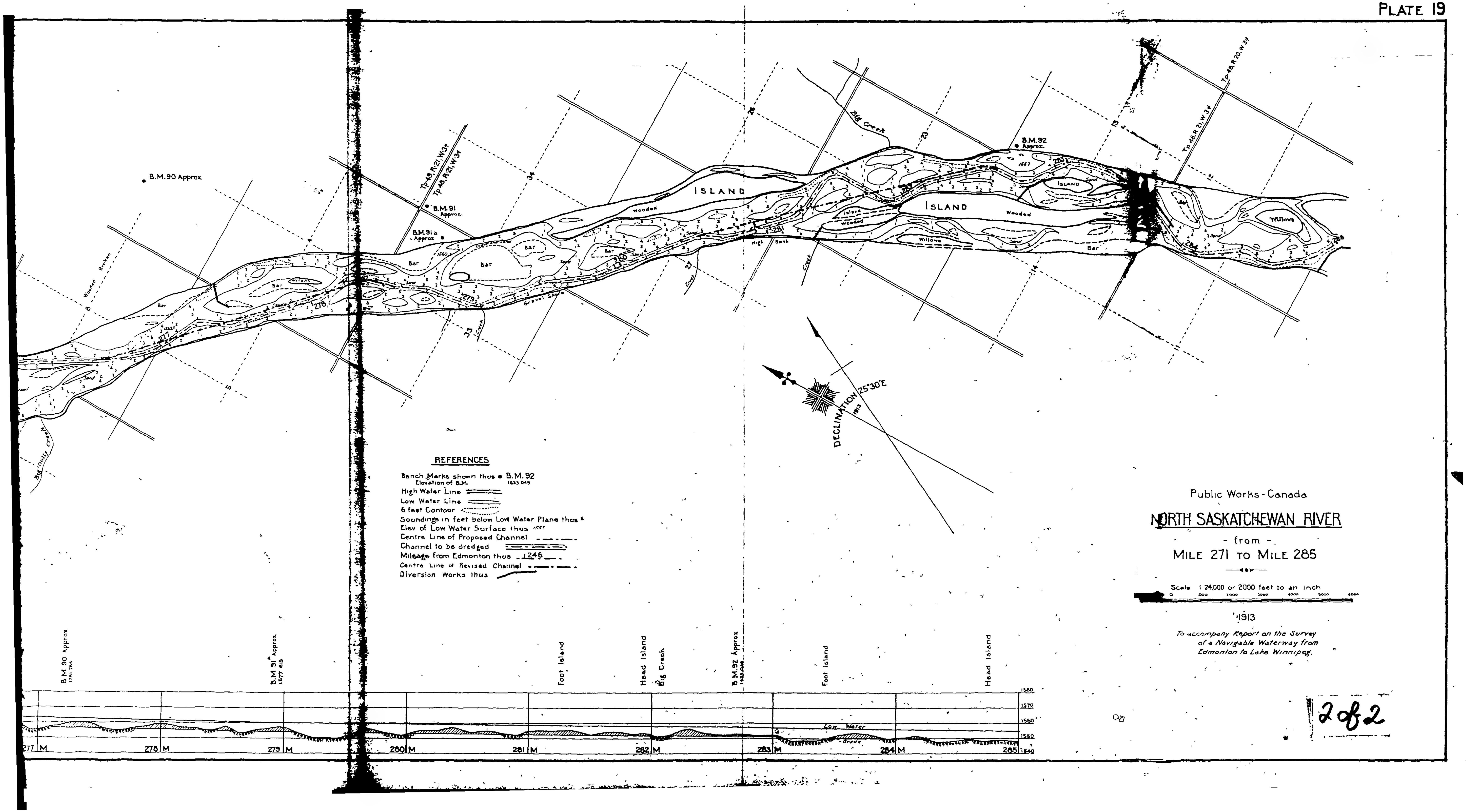

B.M.84
B.M.85
B.M.86
Whitesand Cr
Sand bar
Bar
Island
Stony Shore
Creek
256
257
258
259
260
261
262
263
264
265
266
Tp.51, R.23, W.3d
Tp.50, R.23, W.3d
Tp.51, R.22, W.3rd
Tp.50, R.22, W.3d
Tp.50, R.23, W.3d
DECLINATION 24°15'E
1912
High Water Line
Low Water Line
6 feet Contour
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet - - - Vertical
Datum assumed
Foot Island
Whitesand Creek
B.M 84
B.M 85
Head Sand bar
Foot Sand bar
Head Island
Foot Island
B.M 86
Head Island
Foot Island
Head Island
B.M 87
Low Water
Bottom of Channel
1590
1580
1570
1560
1550
256
257 M
258 M
259 M
260 M
261 M
262 M
263 M
264 M
265 M
266 M
267 M

PLATE 18


REFERENCES
Bench Marks shown thus ● B.M.87
Elevation of B.M. 1592.849
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water Surface thus 1574
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton th 267
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 256 TO MILE 271
Scale - 1:24,000 or 2000 feet to an Inch
1912
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
Tp.50.R.23.W.3d
Tp.50.R.22.W.3d
Tp.50.R.22.W.3rd
Englishman River
High Sand Bar
Island
Bar
Stony Shore
Gravel Shore
B.M.86
B.M.87
B.M.88
Foot Island
Head Island
Foot Island
Head Sand Bar
Foot Sand Bar
Low Water
Grade
263 M
264 M
265 M
266 M
267 M
268 M
269 M
270 M
271
2 of 2



18
Tp.50, R.21, W.3rd
Tp.49, R.21, W.3rd
Tp.50, R.22, W.3rd
Tp.49, R.22, W.3rd
Tp.49, R.21, W.3rd
Tp.48, R.21, W.3rd
B.M.89 Approx.
B.M.90 Approx.
B.M.91 Approx.
B.M.91a Approx.
Sand bar
Sand
Bar
Willows
Wooded
Dry
ISLAND
PINE ISLAND
Gravel
Gravel Shore
Creek
Big Gully Creek
Wooded Broken
High Bank
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet · · · Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B.M.92
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 6
Elev. of Low Water Surface thus 1557
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 1246
Centre Line of Revised Channel
Diversion Works thus
Head Sand bar
Foot Sand bar
Head Island
Foot Island
Head Island
Foot Island
Head Island
Foot Island
Head Pine Island
Foot Pine Island
Big Gully Creek
B.M.90 Approx
B.M.91 Approx.
Foot Island
Low Water
Bottom of Channel
1580
1570
1560
1550
1540
271
272 M
273 M
274 M
275 M
276 M
277 M
278 M
279 M
280 M
281 M


REFERENCES
Bench Marks shown thus ● B.M. 92
Elevation of B.M. 1633.049
High Water Line
Low Water Line
5 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1557
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 1246
Centre Line of Revised Channel
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 271 TO MILE 285
Scale 1:24,000 or 2000 feet to an inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 25°30'E
B.M. 90 Approx.
B.M. 91 Approx.
B.M. 91a Approx.
B.M. 92 Approx.
ISLAND
Island
Wooded
Bar
Willows
Sand
Gravel Shore
High Bank
Big Creek
Tp 49, R 21, W 3rd
Tp 48, R 21, W 3rd
Tp 48, R 20, W 3rd
Foot Island
Head Island
Low Water
Grade
277 M
278 M
279 M
280 M
281 M
282 M
283 M
284 M
285
2 of 2

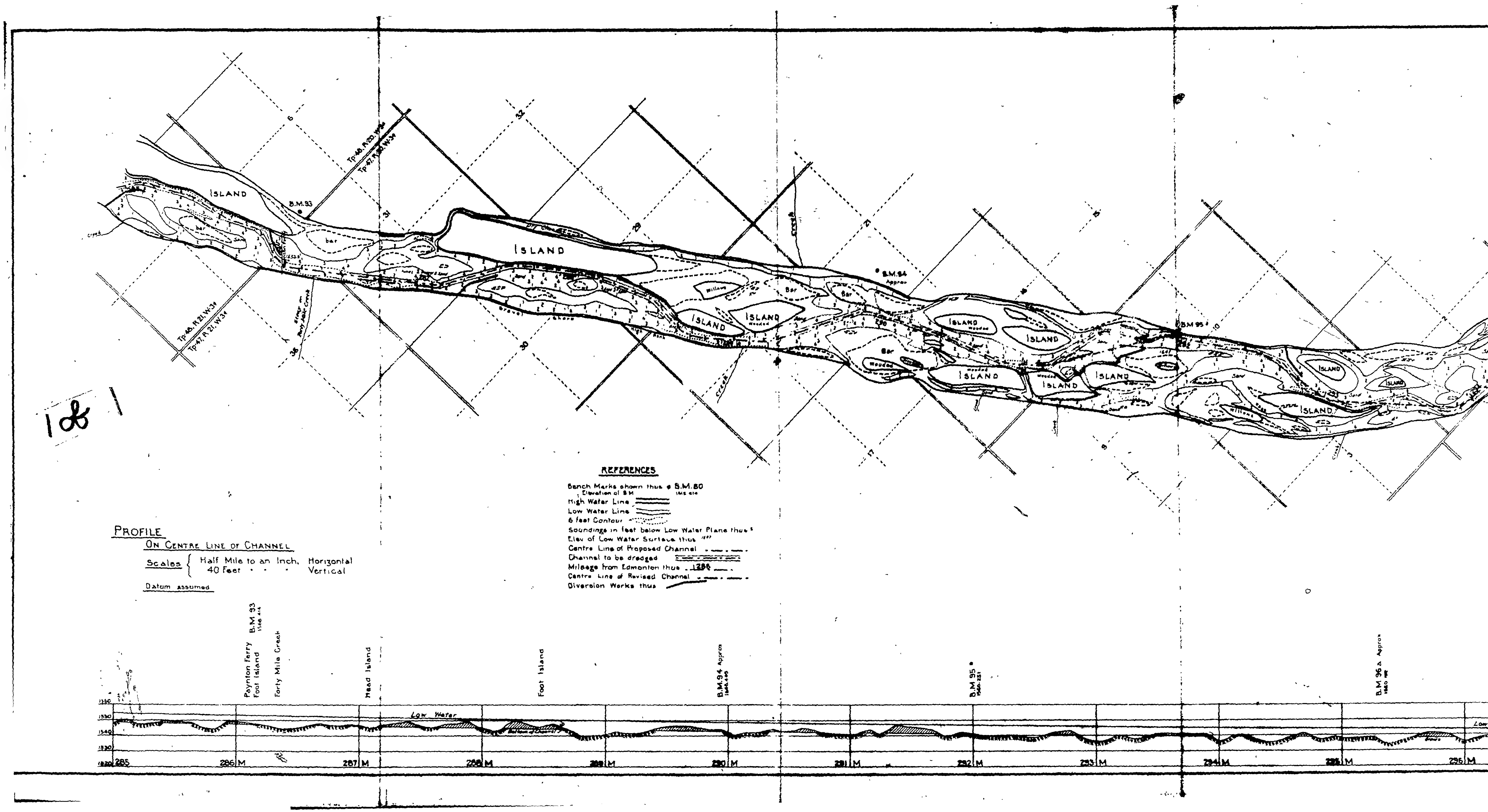
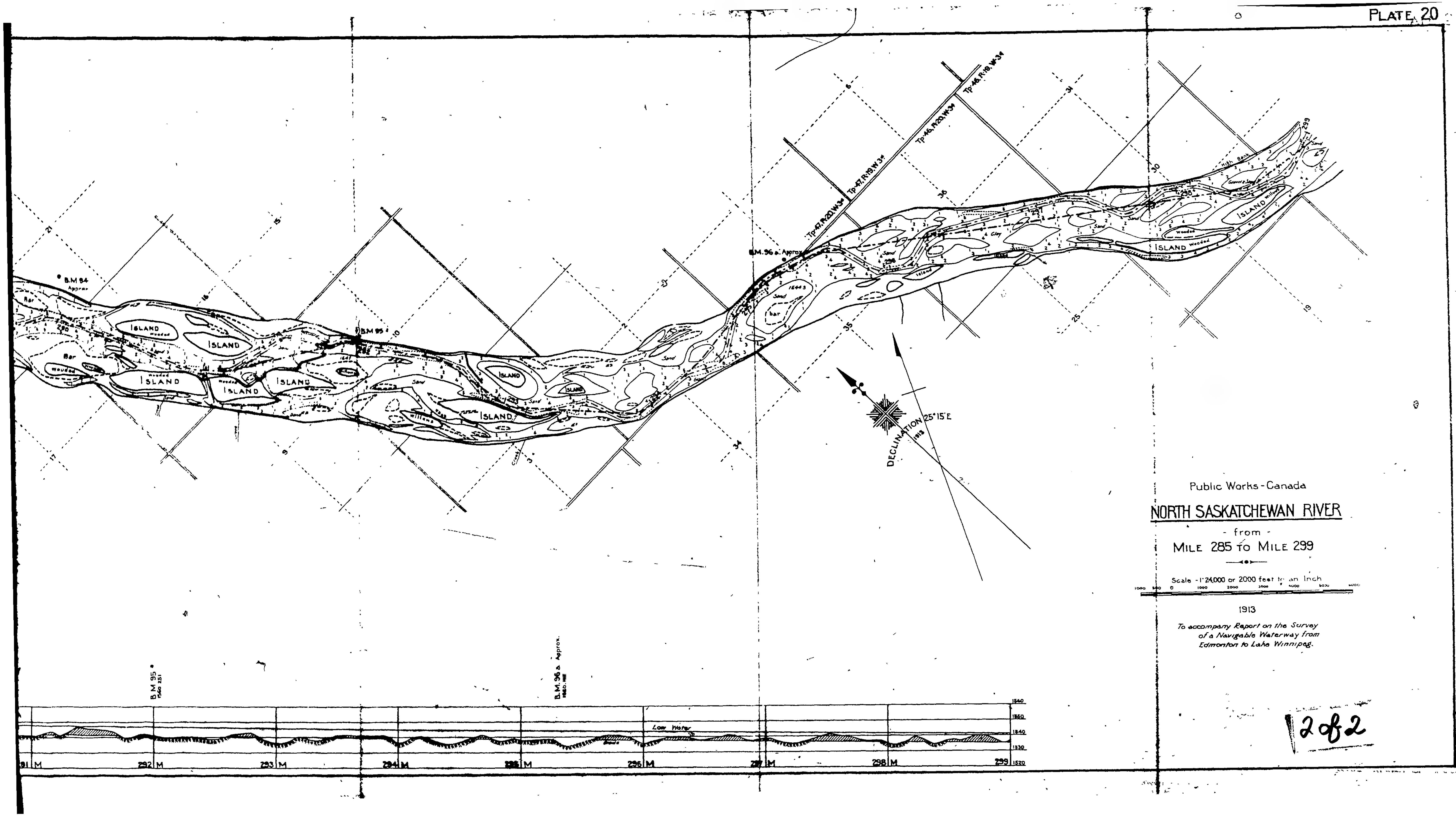

ISLAND
B.M.93
Tp.48.R.20.W.3rd
Tp.47.R.20.W.3rd
Tp.48.R.21.W.3rd
Tp.47.R.21.W.3rd
bar
Forty Mile Creek
ISLAND
Gravel Shore
B.M.94 Approx
Bar
Willows
ISLAND
ISLAND Wooded
Creek
B.M.95
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
REFERENCES
Bench Marks shown thus ● B.M.80
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Paynton Ferry
Foot Island
B.M.93
Forty Mile Creek
Head Island
Foot Island
B.M.94 Approx
B.M.95
B.M.96 Approx
Low Water
Bottom of Channel
285
286 M
287 M
288 M
289 M
290 M
291 M
292 M
293 M
294 M
295 M
296 M

PLATE 20


Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 285 TO MILE 299
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 25°15'E
1913
ISLAND
Island
Sand
bar
Bar
Wooded
Willows
Clay
High Bank
B.M 94 Approx
B.M 95
B.M.96 ∆ Approx.
Tp.47, R.20, W.3rd
Tp.47, R.19, W.3rd
Tp.46, R.20, W.3rd
Tp.46, R.19, W.3rd
Low Water
291 M
292 M
293 M
294 M
295 M
296 M
297 M
298 M
299
2 of 2

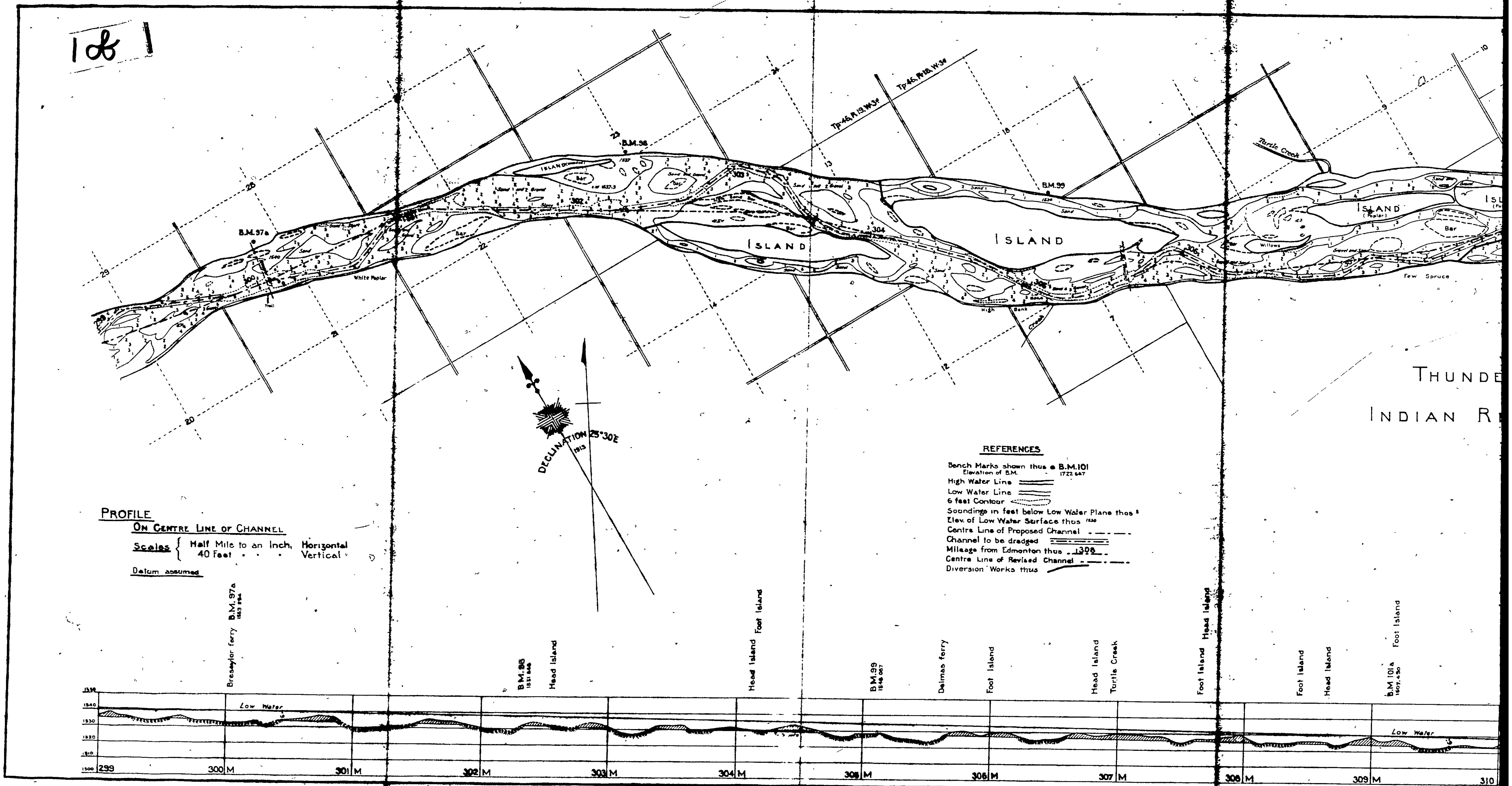
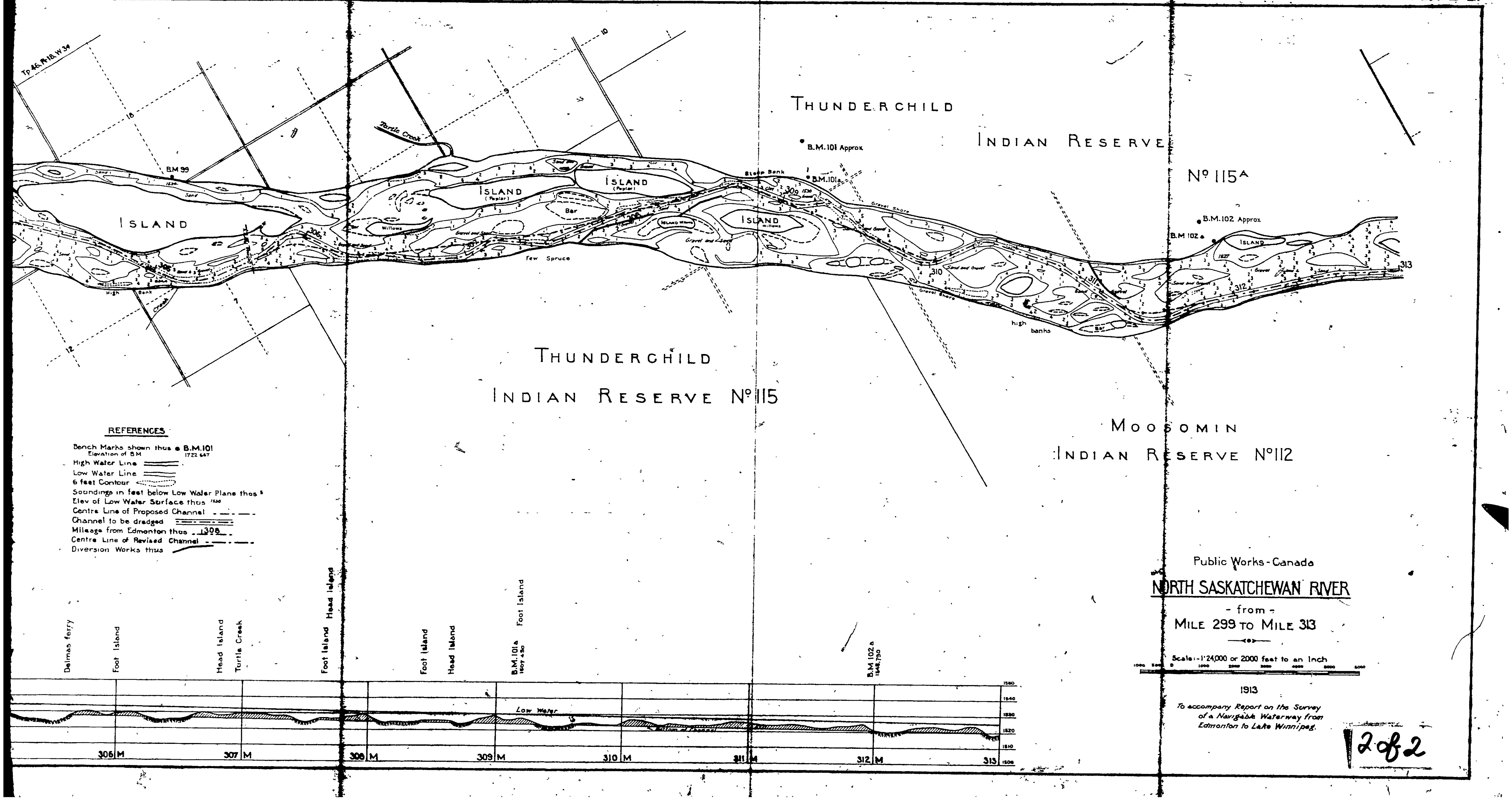
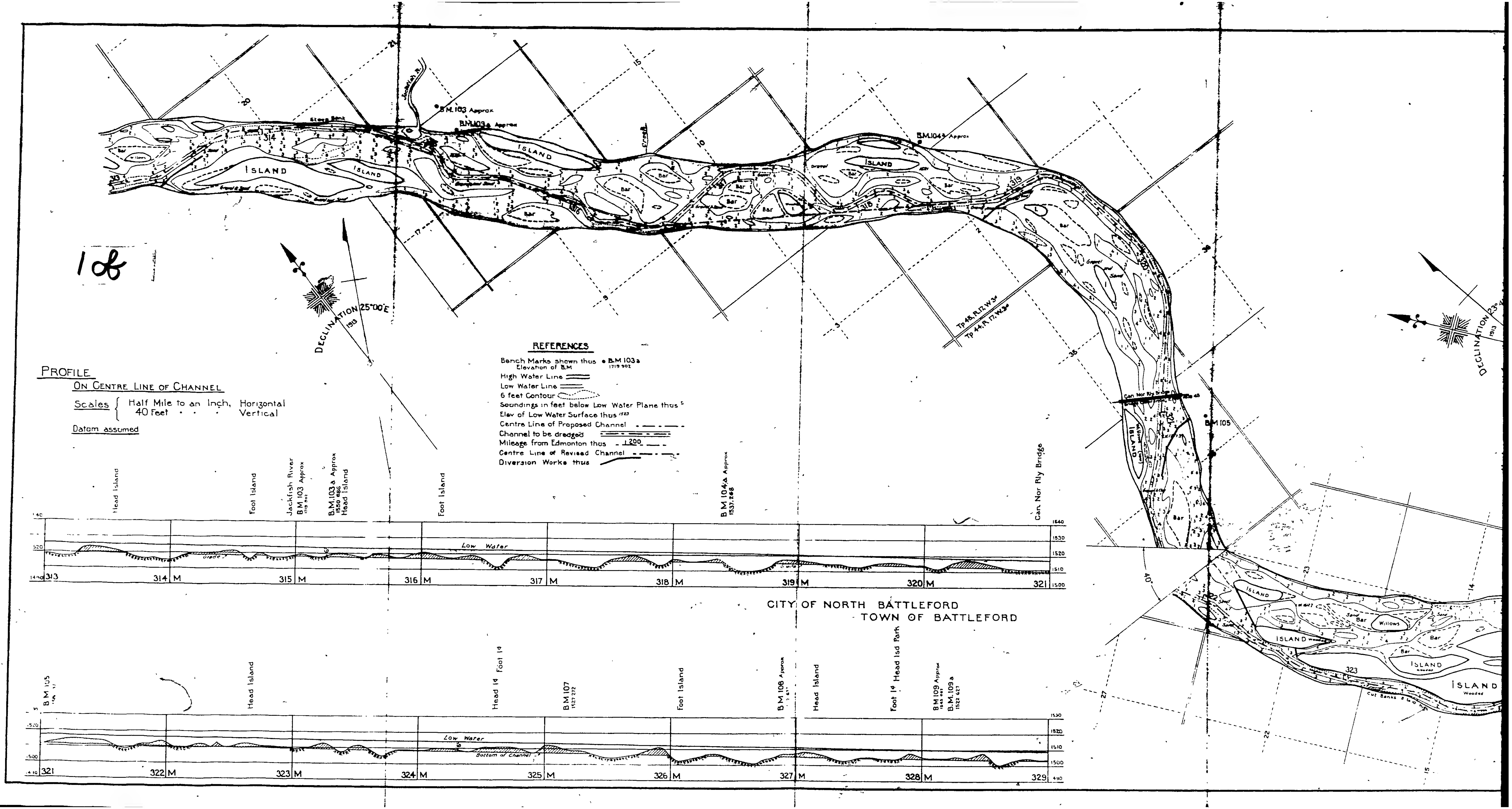

1& 1
THUNDE
INDIAN R
REFERENCES
Bench Marks shown thus ● B.M.101
Elevation of B.M. 1722.647
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water Surface thus 1530
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 1306
Centre Line of Revised Channel
Diversion Works thus
DECLINATION 25°30'E 1913
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal; 40 Feet · · · Vertical
Datum assumed
Tp.46, R.19, W.3rd
Tp.46, R.18, W.3rd
B.M.97a
B.M.98
B.M.99
ISLAND
ISLAND
ISLAND
ISLAND (Poplar)
White Poplar
Few Spruce
Willows
Turtle Creek
High Bank
Creek
Bresaylor ferry
Head Island
Foot Island
Delmas ferry
Turtle Creek
B.M.101a
Low Water
299
300 M
301 M
302 M
303 M
304 M
305 M
306 M
307 M
308 M
309 M
310

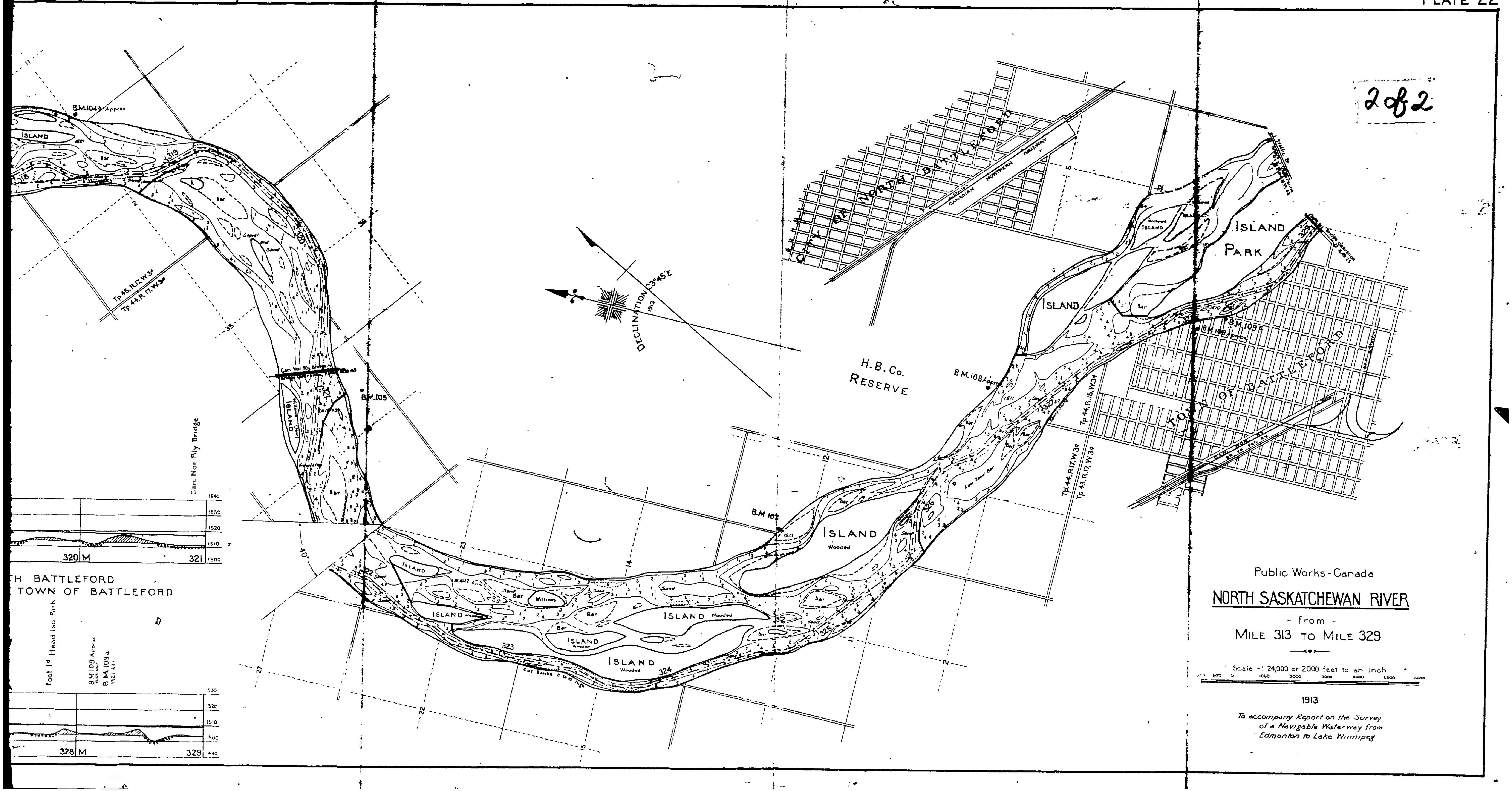
PLATE 21

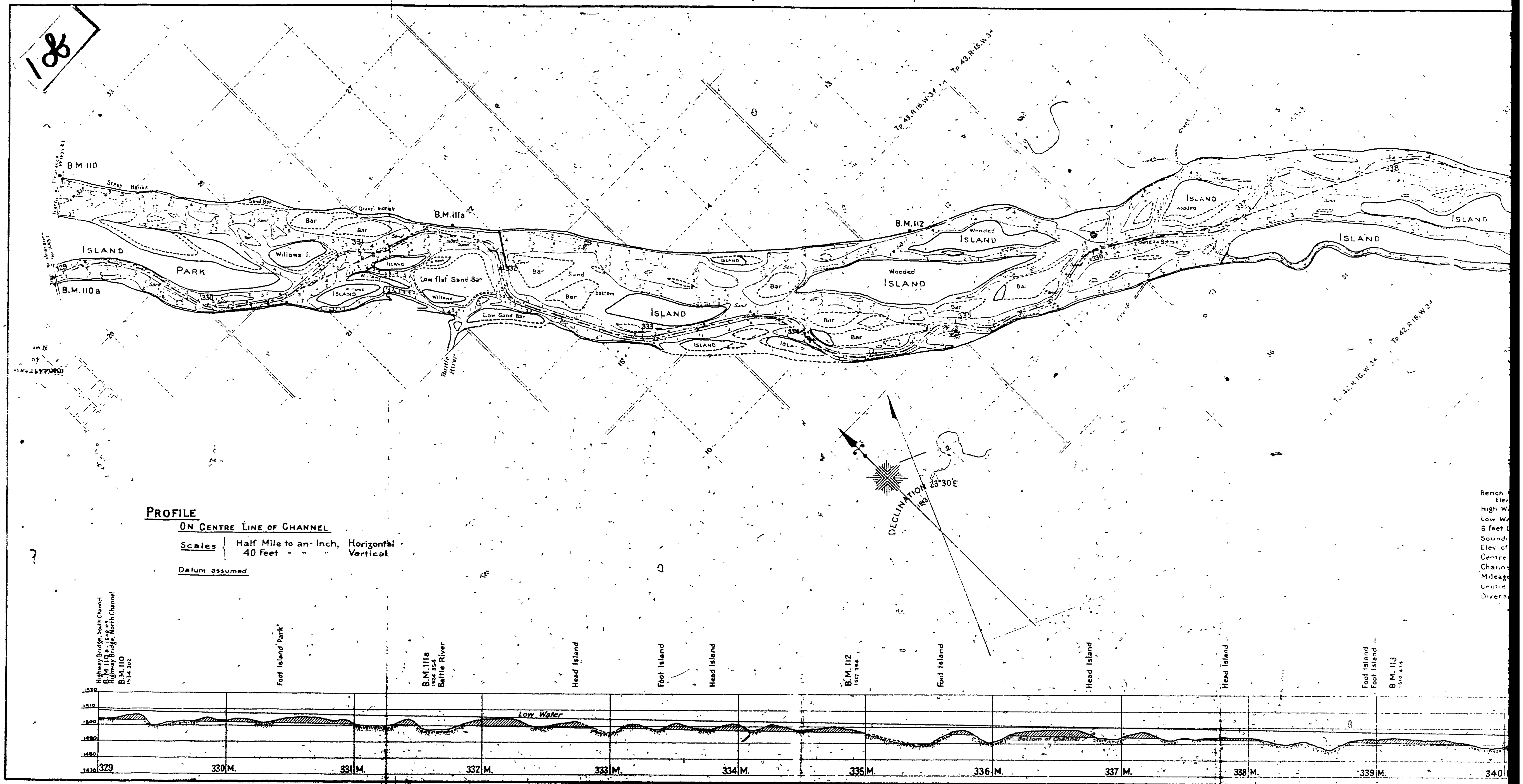


Tp 46 R 18 W 3rd
Turtle Creek
B.M. 99
ISLAND
ISLAND (Poplar)
ISLAND (Poplar)
ISLAND Willows
ISLAND
Bar
Willows
Gravel and Sand
Few Spruce
High Bank
Creek
Steep Bank
B.M. 101 Approx
B.M. 101a
Gravel Shore
Sand and Gravel
high banks
B.M. 102 Approx
B.M. 102 a
ISLAND
306
309
310
311
312
313
THUNDERCHILD
INDIAN RESERVE
Nº 115A
THUNDERCHILD
INDIAN RESERVE Nº 115
MOOSOMIN
INDIAN RESERVE Nº 112
REFERENCES
Bench Marks shown thus ● B.M.101
Elevation of B.M. 1722.667
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1530
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 1308
Centre Line of Revised Channel
Diversion Works thus
Delmas ferry
Foot Island
Head Island
Turtle Creek
Foot Island
Head Island
Foot Island
Head Island
B.M. 101a 1507.430
Foot Island
B.M. 102a 1548.730
Low Water
Bottom of Channel
306 M
307 M
308 M
309 M
310 M
311 M
312 M
313
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 299 TO MILE 313
Scale:- 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
2 of 2

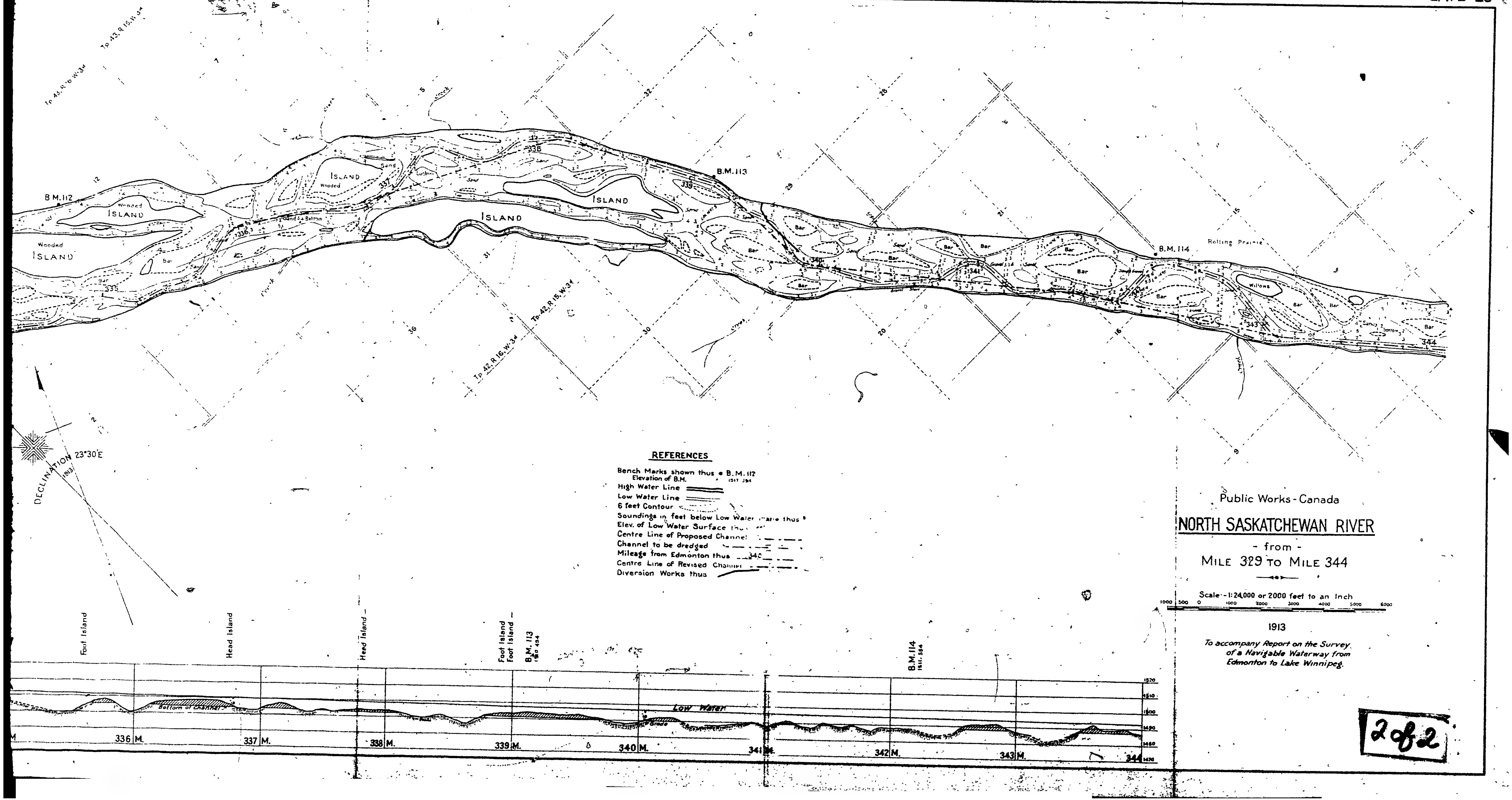


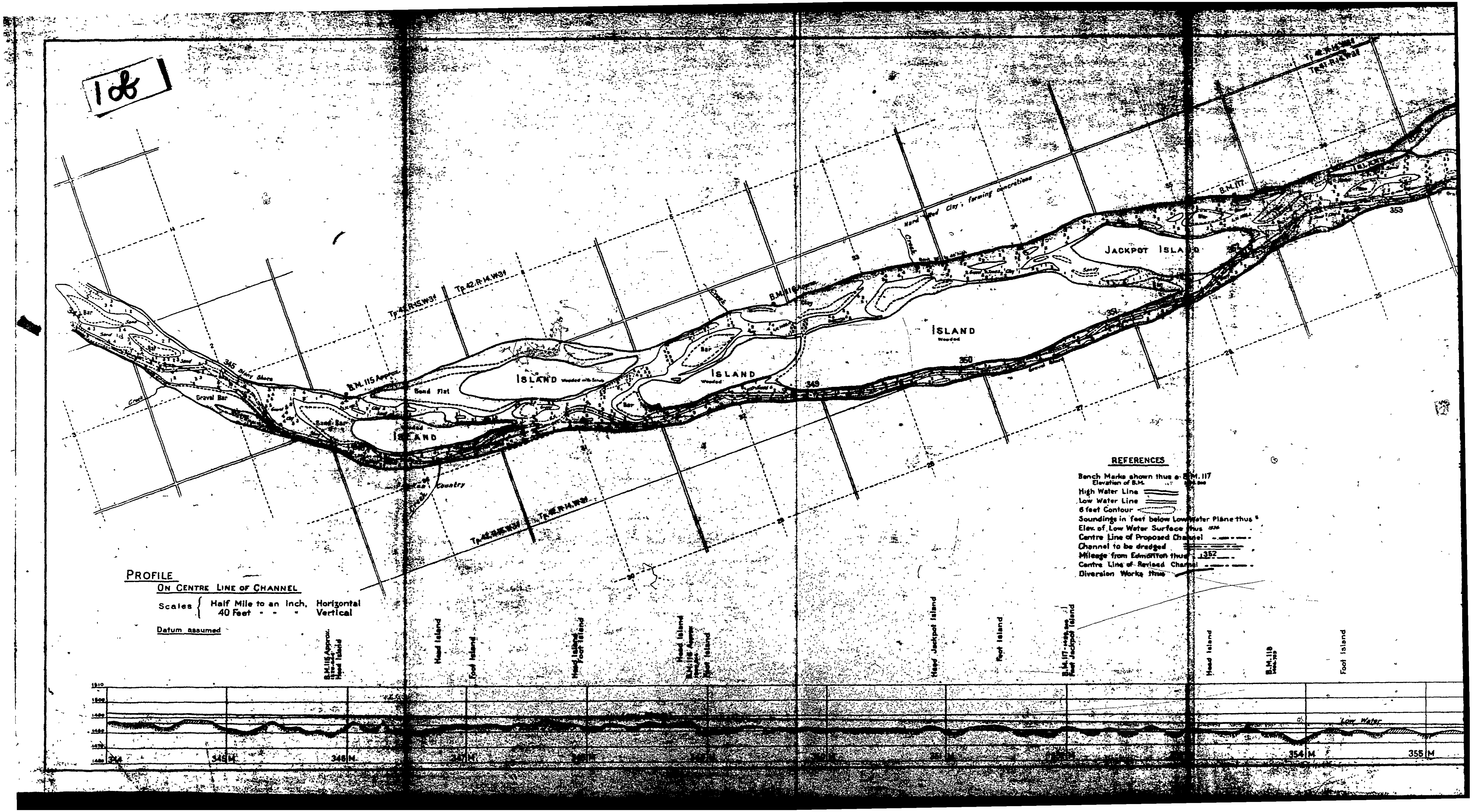
1b
ISLAND
Bar
B.M.103 Approx
B.M.103a Approx
B.M.104a Approx
B.M.105
Steep Bank
Creek
Gravel
Sand
Willows
Can Nor Rly Bridge
Tp.45.R.17.W.3rd
Tp.44.R.17.W.3rd
DECLINATION 25°00'E
1913
REFERENCES
Bench Marks shown thus • B.M.103a
Elevation of B.M. 1719.902
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus 1523
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 200
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet · · · Vertical
Datum assumed
Head Island
Foot Island
Jackfish River
B.M.103 Approx
B.M.103a Approx 1550.686
Head Island
Foot Island
B.M.104a Approx 1537.268
Can Nor Rly Bridge
Low Water
Grade
313
314 M
315 M
316 M
317 M
318 M
319 M
320 M
321
1540
1530
1520
1510
1500
CITY OF NORTH BATTLEFORD
TOWN OF BATTLEFORD
B.M.105
Head Island
Head 1st Foot 1st
B.M.107 1527.272
Foot Island
B.M.108 Approx
Head Island
Foot 1st Head 1sd Park
B.M.109 Approx
B.M.109a 1522.627
Low Water
Bottom of Channel
321
322 M
323 M
324 M
325 M
326 M
327 M
328 M
329
1530
1520
1510
1500
323
Cut Banks
Wooded


2 of 2
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
Mile 313 to Mile 329
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
City of North Battleford
Canadian Northern Railway
Town of Battleford
H. B. Co. Reserve
Island Park
Island
Island Wooded
Bar
Sand
Willows
Low Sand Bar
Cut Banks
Declination 23°45'E 1913
B.M. 104
B.M. 105
B.M. 107
B.M. 108 Approx
B.M. 109a
Can Nor Rly Bridge
Tp 45, R.17, W.3d
Tp 44, R.17, W.3d
Tp 44, R.16, W.3d
Tp 43, R.17, W.3d
318
319
320
321
322
323
324
325
326
329
320 M
321
328 M
329
TH BATTLEFORD
TOWN OF BATTLEFORD
Foot Id Head Isd Park
B.M. 109 Approx
B.M. 109a

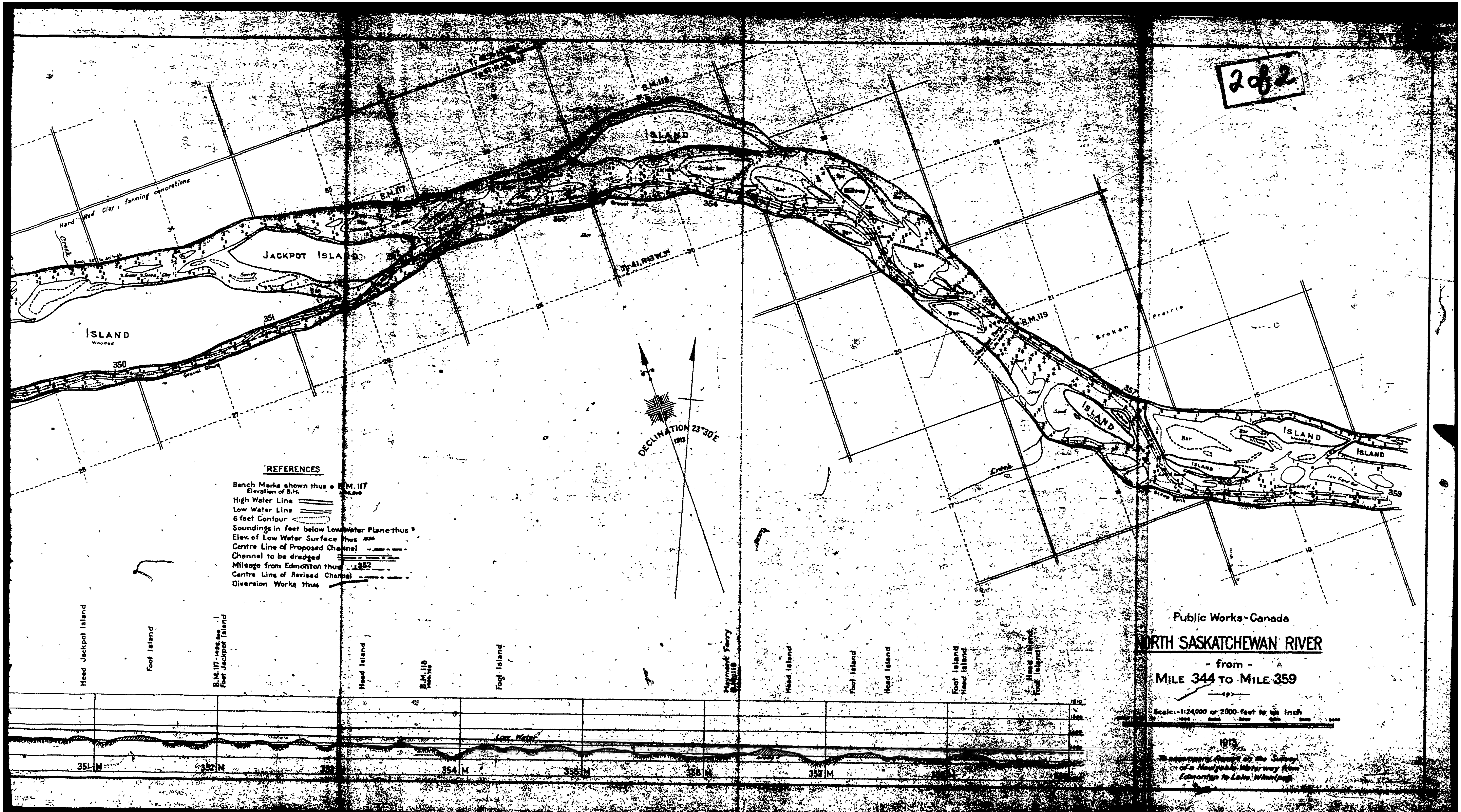


186
B.M.110
Steep Banks
Sand Bar
Gravel Sidehill
B.M.111a
B.M.112
ISLAND
PARK
Willows I.
Bar
Low flat Sand Bar
Low Sand Bar
Willows
Battle River
Sand
bottom
Wooded ISLAND
B.M.110a
Sand & Bottom
Tp.43.R.16.W.3d
Tp.43.R.15.W.3d
Tp.42.R.15.W.3d
DECLINATION 23°30'E
PROFILE
ON CENTRE LINE OF CHANNEL
Scales Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Highway Bridge, South Channel
B.M.110a
Highway Bridge, North Channel
B.M.110
Foot Island 'Park'
B.M.111a
Battle River
Head Island
Foot Island
Head Island
B.M.112
Foot Island
Head Island
Head Island
Foot Island
Foot Island
B.M.113
Low Water
Bottom of Channel
329
330 M.
331 M.
332 M.
333 M.
334 M.
335 M.
336 M.
337 M.
338 M.
339 M.
340

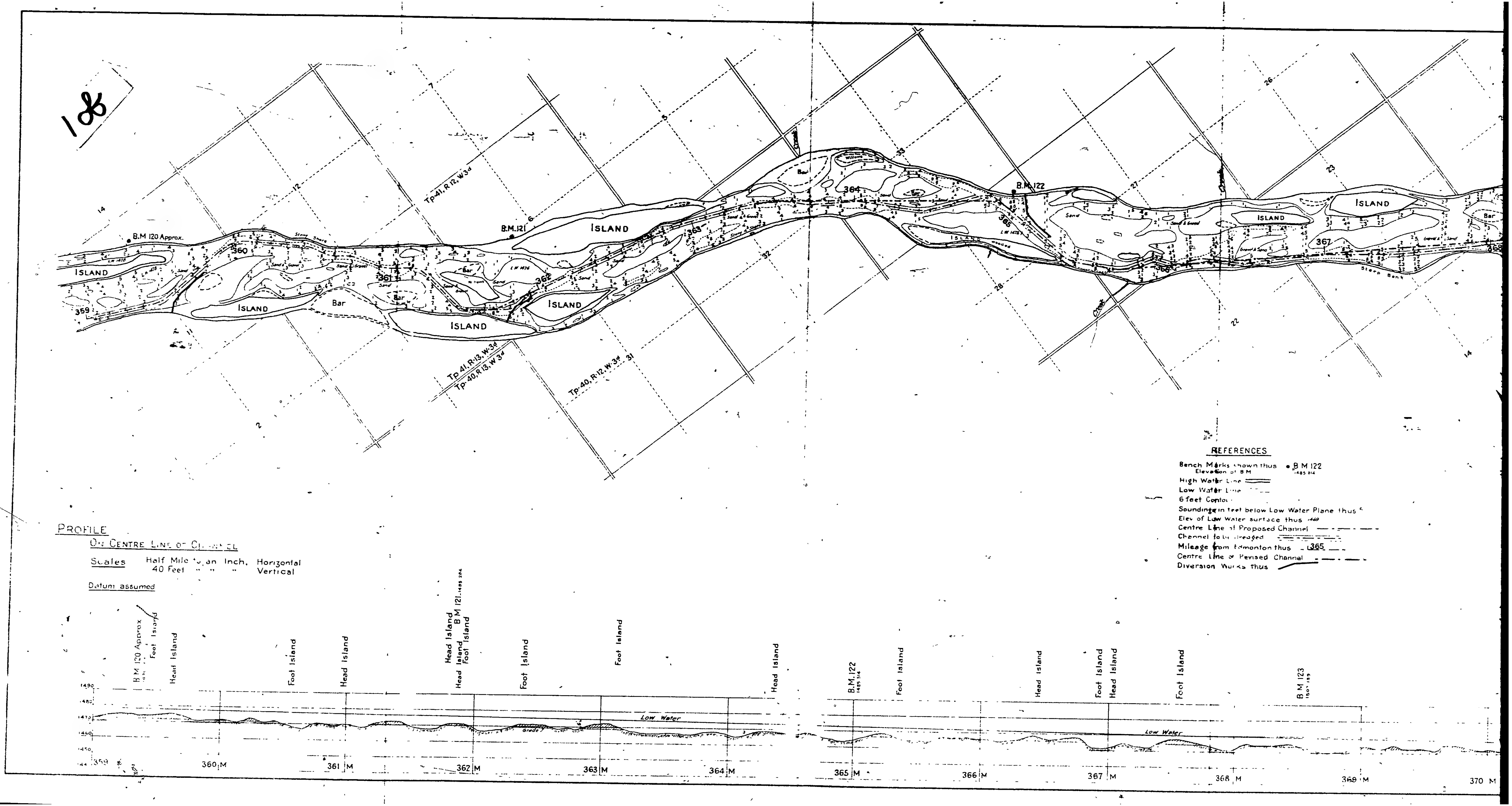

B.M. 112
Wooded
ISLAND
Wooded
ISLAND
ISLAND
Wooded
ISLAND
ISLAND
B.M. 113
B.M. 114
Rolling Prairie
Willows
Tp. 43, R. 15, W. 3rd
Tp. 42, R. 15, W. 3rd
Tp. 42, R. 16, W. 3rd
335
336
337
338
339
340
341
342
343
344
DECLINATION 23°30'E
1913
REFERENCES
Bench Marks shown thus • B.M. 112
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water plane thus
Elev. of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 340
Centre Line of Revised Channel
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 329 TO MILE 344
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
Foot Island
Head Island
Head Island
Foot Island
Foot Island
B.M. 113
B.M. 114
Bottom of Channel
Low Water
336 M.
337 M.
338 M.
339 M.
340 M.
341 M.
342 M.
343 M.
344
2 of 2



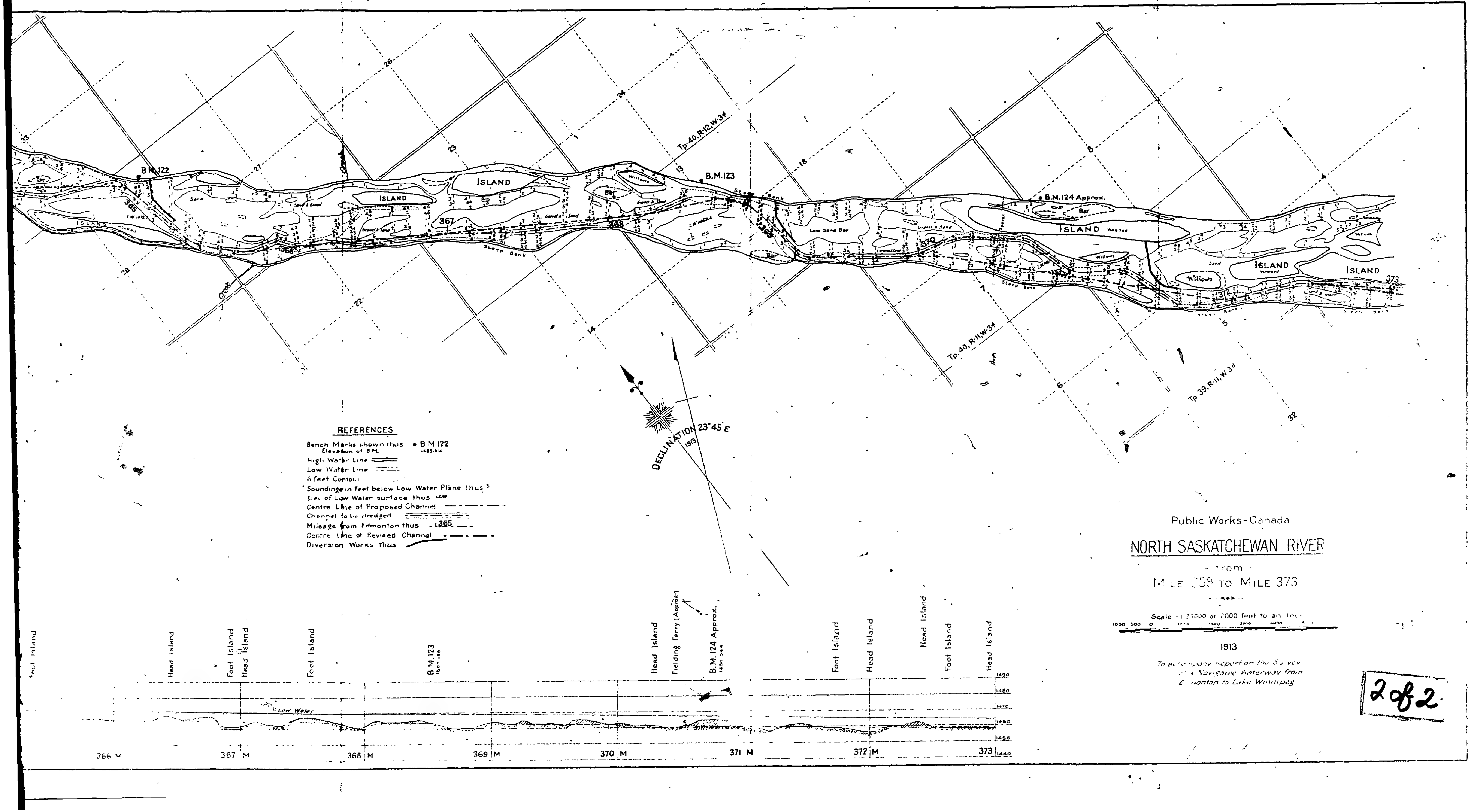
108
JACKPOT ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
Sand Flat
Gravel Bar
Sand Bar
Bar
REFERENCES
Bench Marks shown thus e.g. B.M. 117
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev. of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 352
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet - - - Vertical
Datum assumed
Head Island
Foot Island
Head Jackpot Island
Foot Island
Low Water
345 M
346 M
354 M
355 M

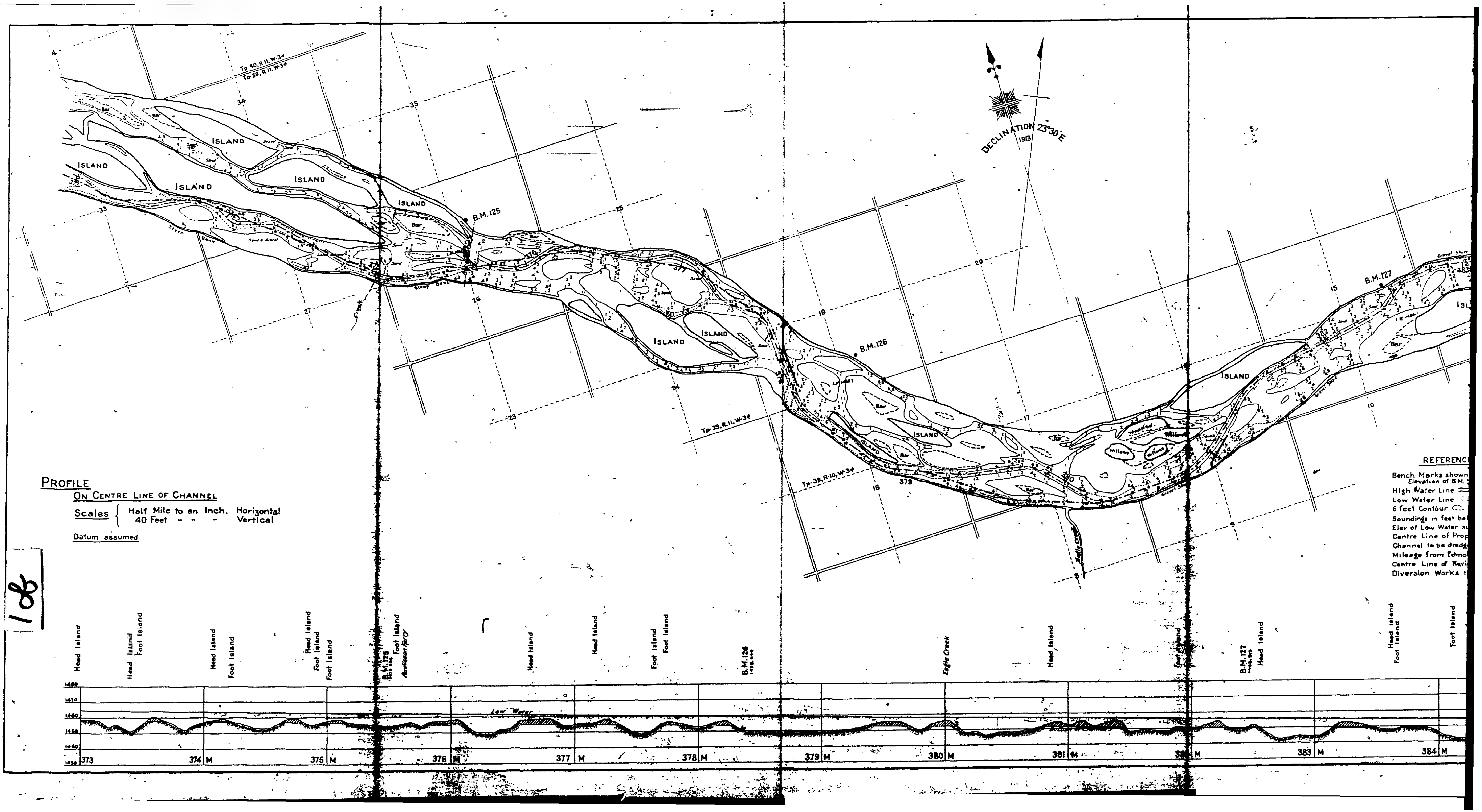

2 of 2
ISLAND
B.M. 118
B.M. 117
Hard Red Clay, forming concretions
Creek
JACKPOT ISLAND
ISLAND
Wooded
351
350
353
354
Gravel Bars
Bar
Sand Bar
B.M. 119
Broken Prairie
357
ISLAND
ISLAND
Wooded
ISLAND
Low Sand Bar
359
Sand
Creek
DECLINATION 23°30′E
1913
REFERENCES
Bench Marks shown thus B.M. 117
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev. of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 352
Centre Line of Revised Channel
Diversion Works thus
Head Jackpot Island
Foot Island
B.M. 117
Foot Jackpot Island
Head Island
B.M. 118
Foot Island
Haymark Ferry
B.M. 119
Head Island
Foot Island
Head Island
Foot Island
Head Island
Head Island
Foot Island
Low Water
351 M
352 M
353
354 M
355 M
356 M
357 M
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 344 TO MILE 359
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg

18



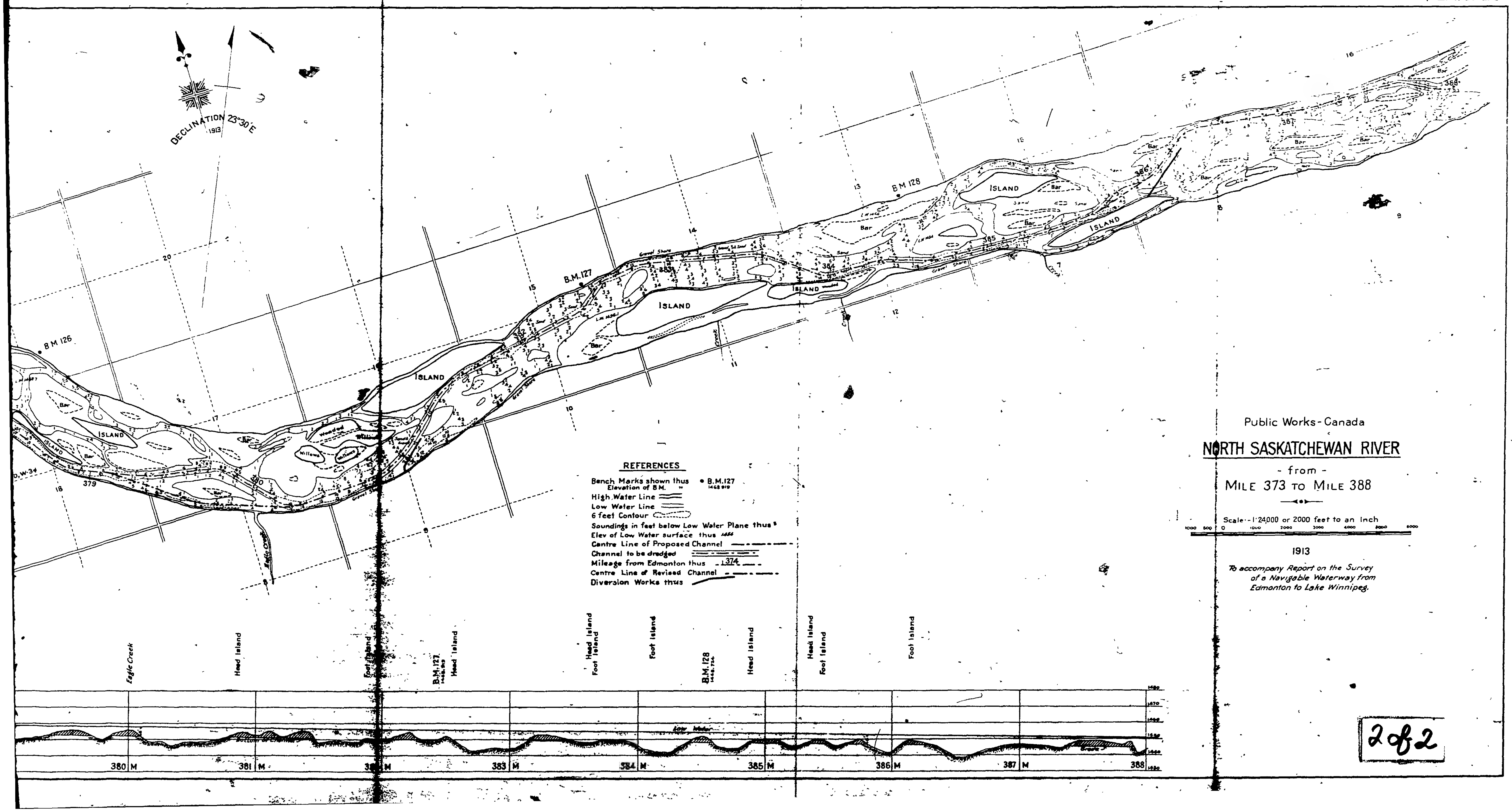
ISLAND
Bar
B.M 120 Approx.
B.M.121
B.M.122
Tp.41, R.12, W.3d
Tp.41, R.13, W.3d
Tp.40, R.13, W.3d
Tp.40, R.12, W.3d
359
360
361
362
363
364
365
366
367
Steep Bank
Sand
Willows
REFERENCES
Bench Marks shown thus ● B.M 122 1485.514
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1469
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 365
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M 120 Approx.
Foot Island
Head Island
Head Island
B.M.121
Foot Island
B.M.122
B.M.123
Low Water
Grade
359
360 M
361 M
362 M
363 M
364 M
365 M
366 M
367 M
368 M
369 M
370 M


ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
B.M.122
B.M.123
B.M.124 Approx.
Tp.40, R.12, W.3d
Tp.40, R.11, W.3d
Tp.39, R.11, W.3d
Low Sand Bar
Steep Bank
Willows
Bar
365
366
367
368
370
373
DECLINATION 23°45' E
1913
REFERENCES
Bench Marks shown thus • B M 122
Elevation of B M. 1485.814
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1469
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 365
Centre Line of Revised Channel
Diversion Works thus
Public Works-Canada
NORTH SASKATCHEWAN RIVER
- from -
TO MILE 373
1913
Foot Island
Head Island
Foot Island
Head Island
Foot Island
B.M.123
Head Island
Fielding Ferry (Approx.)
B.M.124 Approx.
Foot Island
Head Island
Head Island
Foot Island
Head Island
Low Water
366 M
367 M
368 M
369 M
370 M
371 M
372 M
373
1490
1480
1470
1460
1450
1440
2 of 2

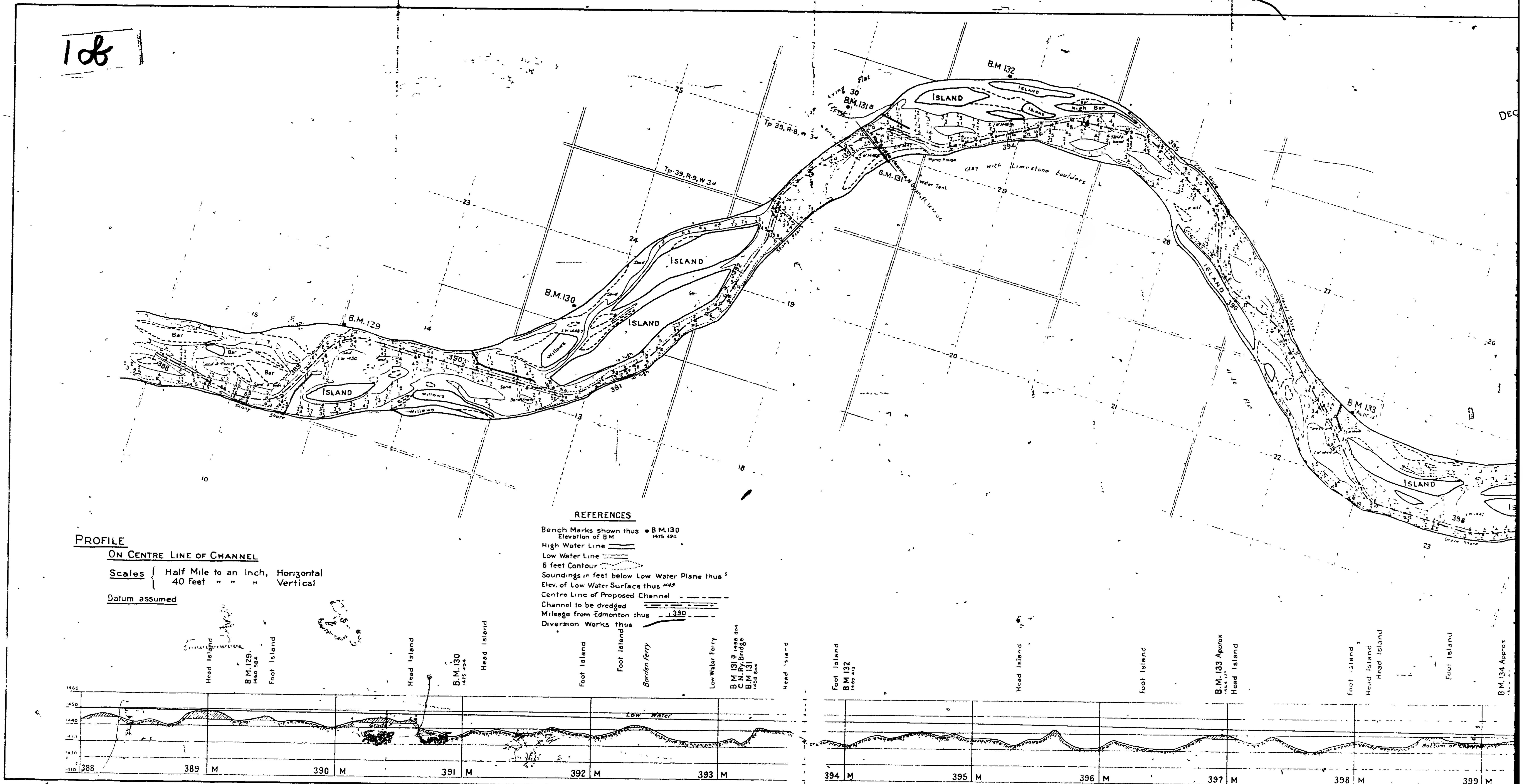


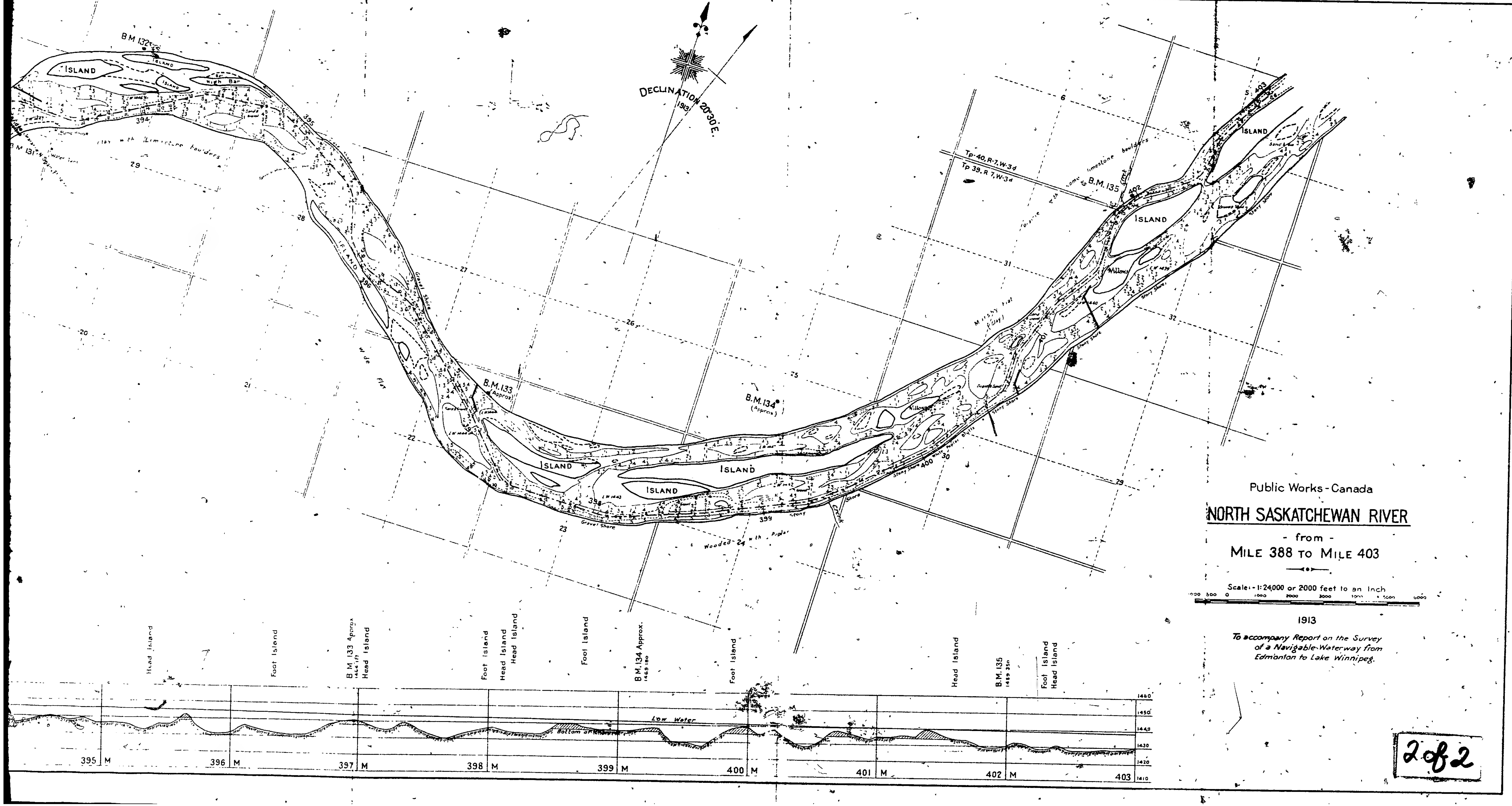
Tp. 40, R. 11, W. 3rd
Tp. 39, R. 11, W. 3rd
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
B.M. 125
B.M. 126
B.M. 127
DECLINATION 23°30' E
1913
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
Tp. 39, R. 11, W. 3rd
Tp. 39, R. 10, W. 3rd
Eagle Creek
Willows
Steep Bank
Sand & Gravel
Bar
REFERENC
Bench Marks shown
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet be
Elev of Low Water s
Centre Line of Prop
Channel to be dredg
Mileage from Edmo
Centre Line of Revi
Diversion Works t
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch. Horizontal
40 Feet " " " Vertical
Datum assumed
108
Head Island
Head Island
Foot Island
Head Island
Foot Island
Head Island
Foot Island
Foot Island
B.M. 125
Foot Island
Robinson Ferry
Head Island
Head Island
Foot Island
Foot Island
B.M. 126
Eagle Creek
Head Island
Foot Island
B.M. 127
Head Island
Head Island
Foot Island
Foot Island
Low Water
1480
1470
1460
1450
1440
1430
373
374 M
375 M
376 M
377 M
378 M
379 M
380 M
381 M
382 M
383 M
384 M

PLATE 26

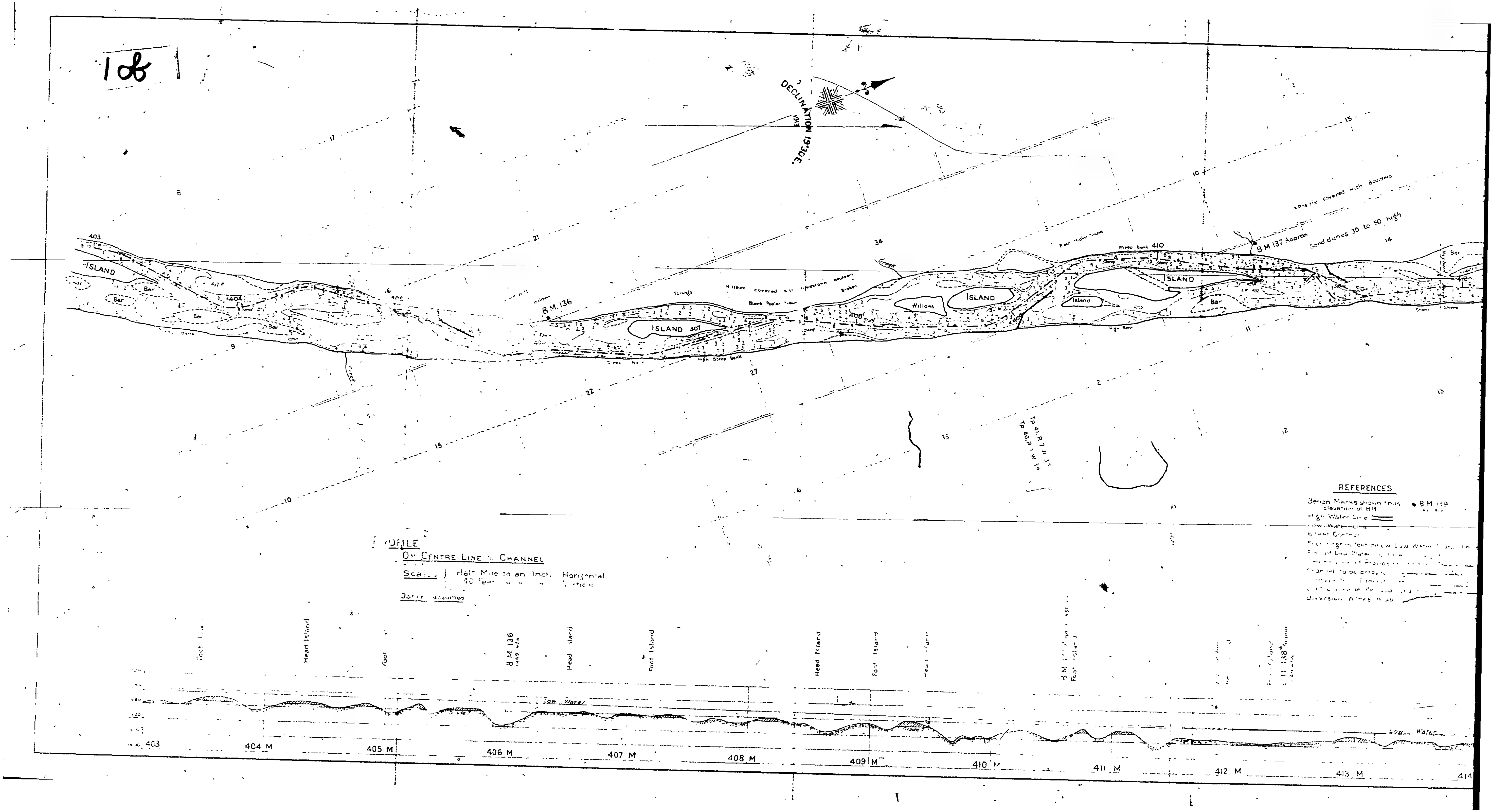

DECLINATION 23°30' E
1913
B.M. 126
B.M. 127
B.M. 128
ISLAND
Bar
Willows
Wooded
Gravel Shore
Eagle Creek
Creek
REFERENCES
Bench Marks shown thus • B.M.127
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 374
Centre Line of Revised Channel
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 373 TO MILE 388
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
Eagle Creek
Head Island
Foot Island
B.M.127
Head Island
Head Island
Foot Island
Foot Island
B.M.128
Head Island
Head Island
Foot Island
Foot Island
Low Water
380 M
381 M
382 M
383 M
384 M
385 M
386 M
387 M
388
2 of 2

10b


ISLAND
B.M. 129
B.M. 130
B.M. 131
B.M. 131a
B.M. 132
B.M. 133 Approx
Tp 39, R 8, W 3d
Tp 39, R 9, W 3d
Willows
Stony Shore
Clay with Limestone boulders
Pump House
Water Tank
High Bar
Gravel Shore
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B.M. 130 1475 494
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water Surface thus 1449
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 390
Diversion Works thus
Head Island
Foot Island
Borden Ferry
Low Water Ferry
C.N. Ry. Bridge
B.M. 134 Approx
Low Water
Grade
Bottom of Channel
388
389 M
390 M
391 M
392 M
393 M
394 M
395 M
396 M
397 M
398 M
399 M

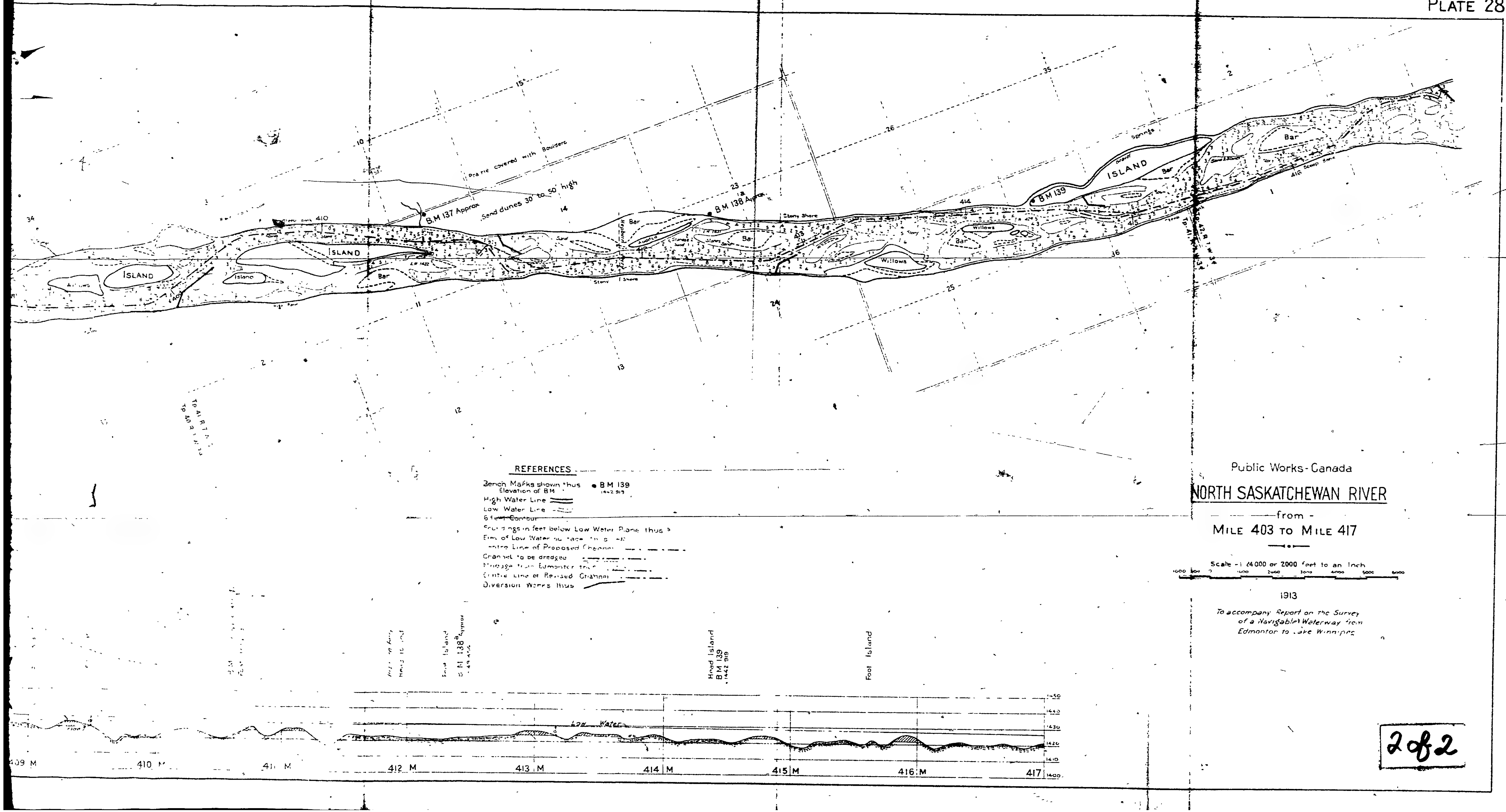

Public Works-Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 388 TO MILE 403
Scale:- 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 20°30' E.
1913
B.M. 132
B.M. 133 (Approx)
B.M. 134 (Approx)
B.M. 135
ISLAND
High Bar
Clay with limestone boulders
Gravel Shore
Stony Shore
Wooded 24 with Poplar
Creek
Tp 40, R 7, W 3d
Tp 39, R 7, W 3d
Marshy Flat (Clay)
Willows
Low Water
Bottom of Channel
Head Island
Foot Island
B.M. 133 Approx.
B.M. 134 Approx.
395 M
396 M
397 M
398 M
399 M
400 M
401 M
402 M
403
1460
1450
1440
1430
1420
1410

2 of 2

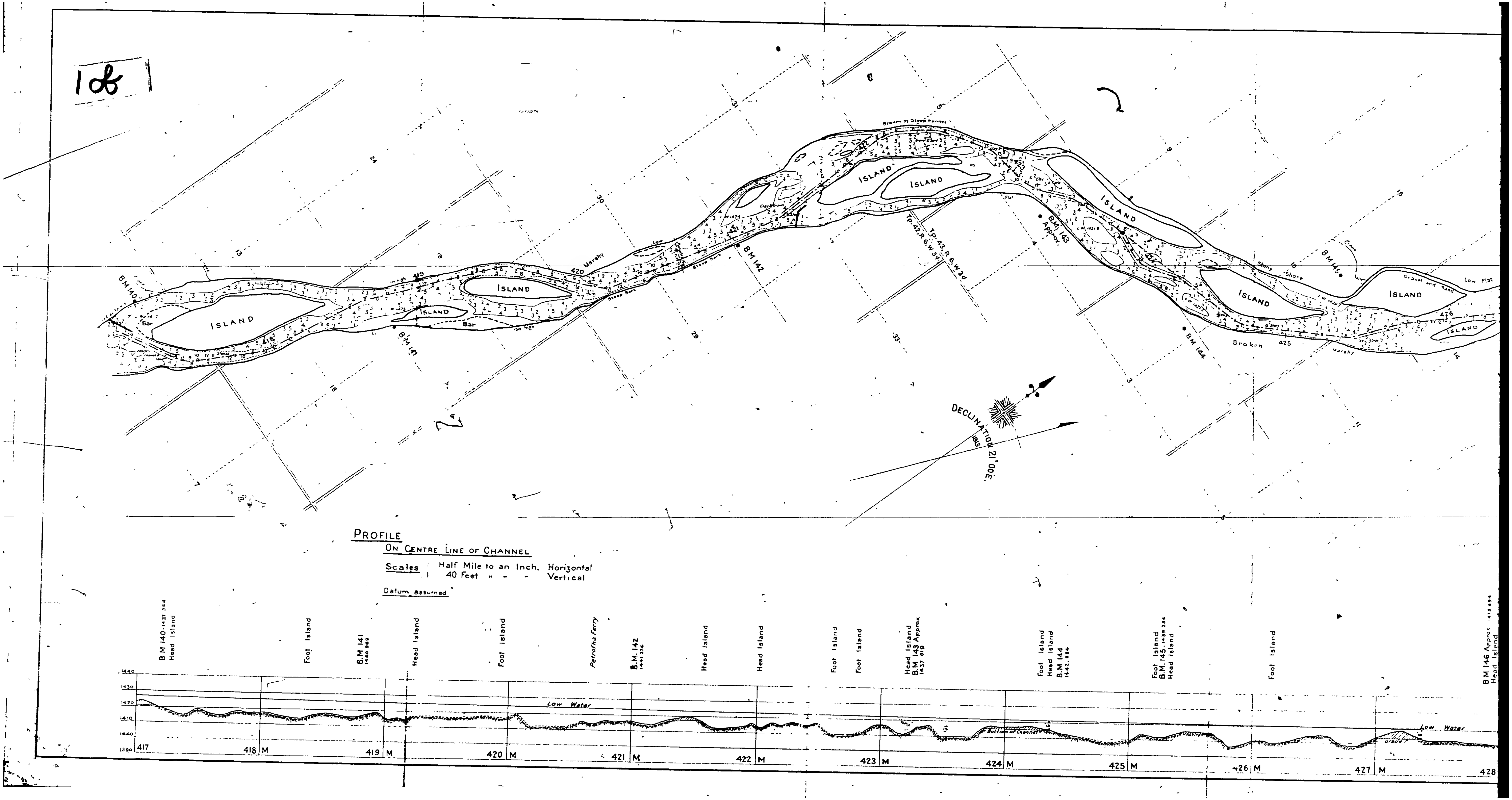


10b
DECLINATION 19°30'E. 1913
ISLAND
Bar
B.M. 136
ISLAND 407
Willows
ISLAND
Island
ISLAND
Bar
Steep bank 410
B M 137 Approx.
Prairie covered with Boulders
Sand dunes 30 to 50 high
High Steep Bank
Black Poplar
Springs
Creek
Tp 41 R 7 W 3rd
Tp 40 R 7 W 3rd
REFERENCES
PROFILE
On Centre Line of Channel
Scale 1 Half Mile to an Inch Horizontal
Datum assumed
Head Island
Foot Island
Low Water
403
404 M
405 M
406 M
407 M
408 M
409 M
410 M
411 M
412 M
413 M
414

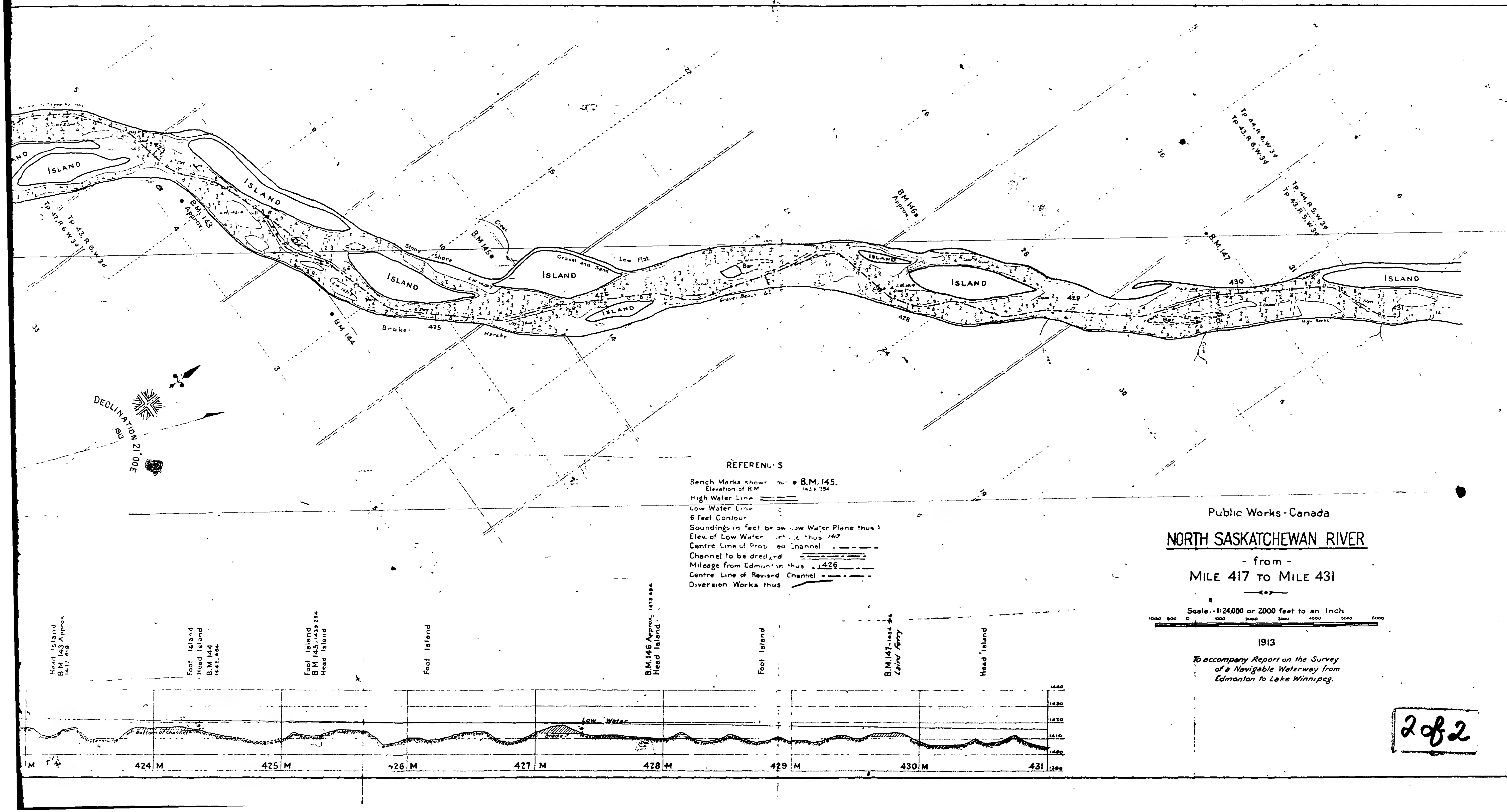
Plate 28

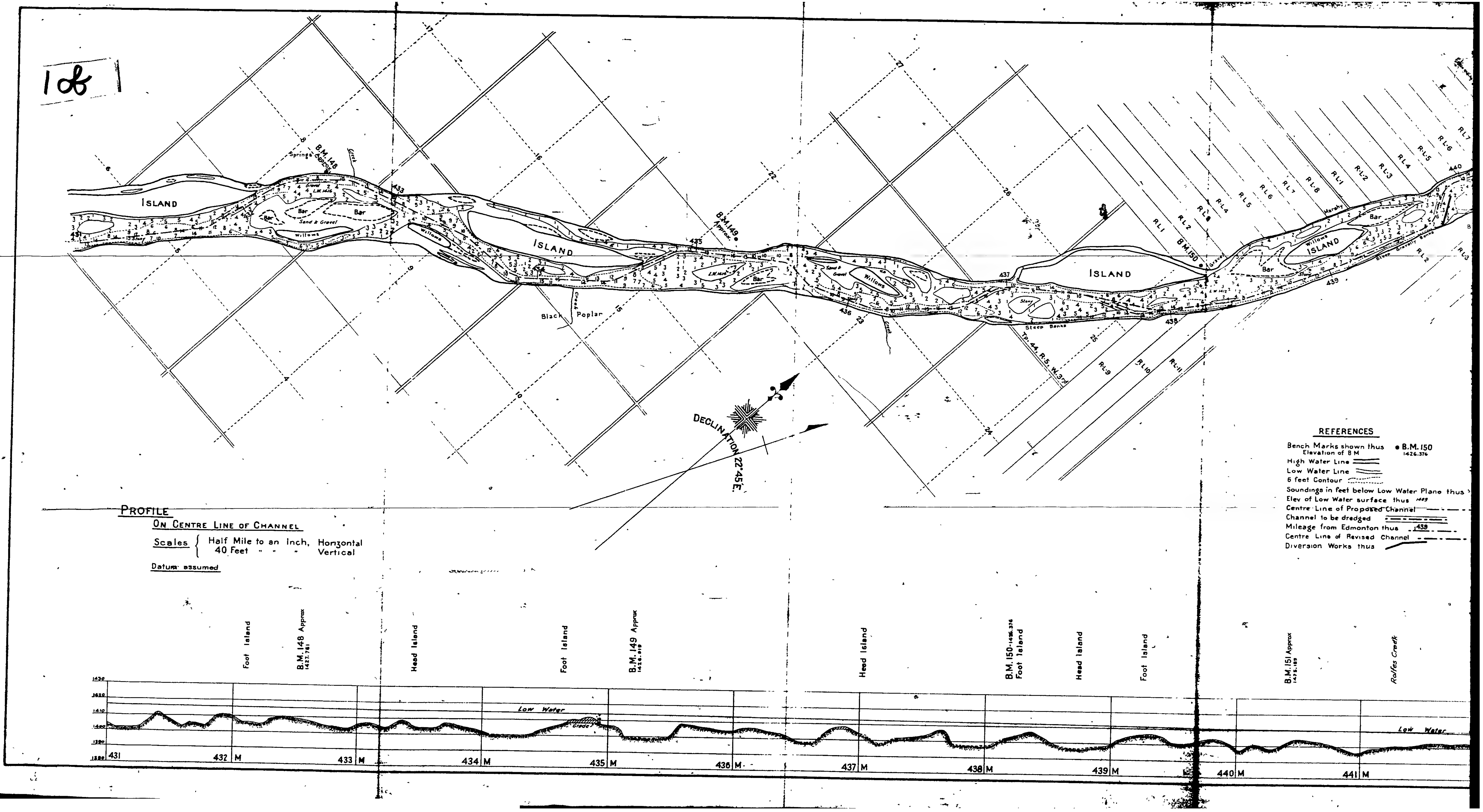


2 of 2



ISLAND
Bar
BM 140
BM 141
BM 142
BM 143 Approx.
BM 144
BM 145
Marshy
Steep Bank
Broken by Steep Ravines
Tp. 42, R. 6, W. 3d
Tp. 43, R. 6, W. 3d
Stony Shore
Gravel and Sand
Low Flat
Broken 425
DECLINATION 21° 00' E.
1913
PROFILE
ON CENTRE LINE OF CHANNEL
Scales : Half Mile to an Inch, Horizontal
40 Feet " " Vertical
Datum assumed
BM 140 - 1437.344 Head Island
Foot Island
B.M. 141
Head Island
Petrofka Ferry
B.M. 142
B.M. 143 Approx
B.M. 144
B.M. 145
BM 146 Approx
Low Water
Bottom of Channel
Grade
417
418 M
419 M
420 M
421 M
422 M
423 M
424 M
425 M
426 M
427 M
428


Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 417 TO MILE 431
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B.M. 145.
Elevation of B.M. 1433.234
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water Surface thus 1419
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 426
Centre Line of Revised Channel
Diversion Works thus
DECLINATION 1913 21° 00' E
ISLAND
B.M. 143 Approx.
B.M. 144
B.M. 145
B.M. 146 Approx.
B.M. 147
Tp. 42 R. 6 W. 3d
Tp. 43 R. 6 W. 3d
Tp. 44 R. 6 W. 3d
Tp. 44 R. 5 W. 3d
Tp. 43 R. 5 W. 3d
Gravel and Sand
Low Flat
Bar
Gravel Beach
Broken
Marshy
Stony Shore
High Banks
Creek
425
426
428
429
430
431
Head Island B.M. 143 Approx. 1437.619
Foot Island
Head Island B.M. 144 1442.684
Foot Island B.M. 145 1433.234 Head Island
Foot Island
B.M. 146 Approx. 1478.494 Head Island
Foot Island
B.M. 147 1434 Laird Ferry
Head Island
Low Water
Bottom of Channel
Grade
M 424 M 425 M 426 M 427 M 428 M 429 M 430 M 431
1440
1430
1420
1410
1400
1390
2 of 2


10
Island
Springs Approx.
B.M. 148
Bar
Sand & Gravel
Willows
Creek
Island
B.M. 149 Approx.
Black Poplar
Creek
Sand & Gravel
Willows
Bar
Island
B.M. 150
Steep Banks
Tp. 44, R. 5, W. 3rd
Marshy
Bar
Willows
Island
Steep Gravelly Banks
RL 1
RL 2
RL 3
RL 4
RL 5
RL 6
RL 7
RL 8
RL 9
RL 10
RL 11
DECLINATION 22°45'E.
REFERENCES
Bench Marks shown thus • B.M. 150
Elevation of B.M. 1426.376
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus 1413
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 439
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Foot Island
B.M. 148 Approx 1427.781
Head Island
Foot Island
B.M. 149 Approx 1426.919
Head Island
B.M. 150 1426.376
Foot Island
Head Island
Foot Island
B.M. 151 Approx 1425.189
Rolfes Creek
Low Water
Grade
431
432 M
433 M
434 M
435 M
436 M
437 M
438 M
439 M
440 M
441 M

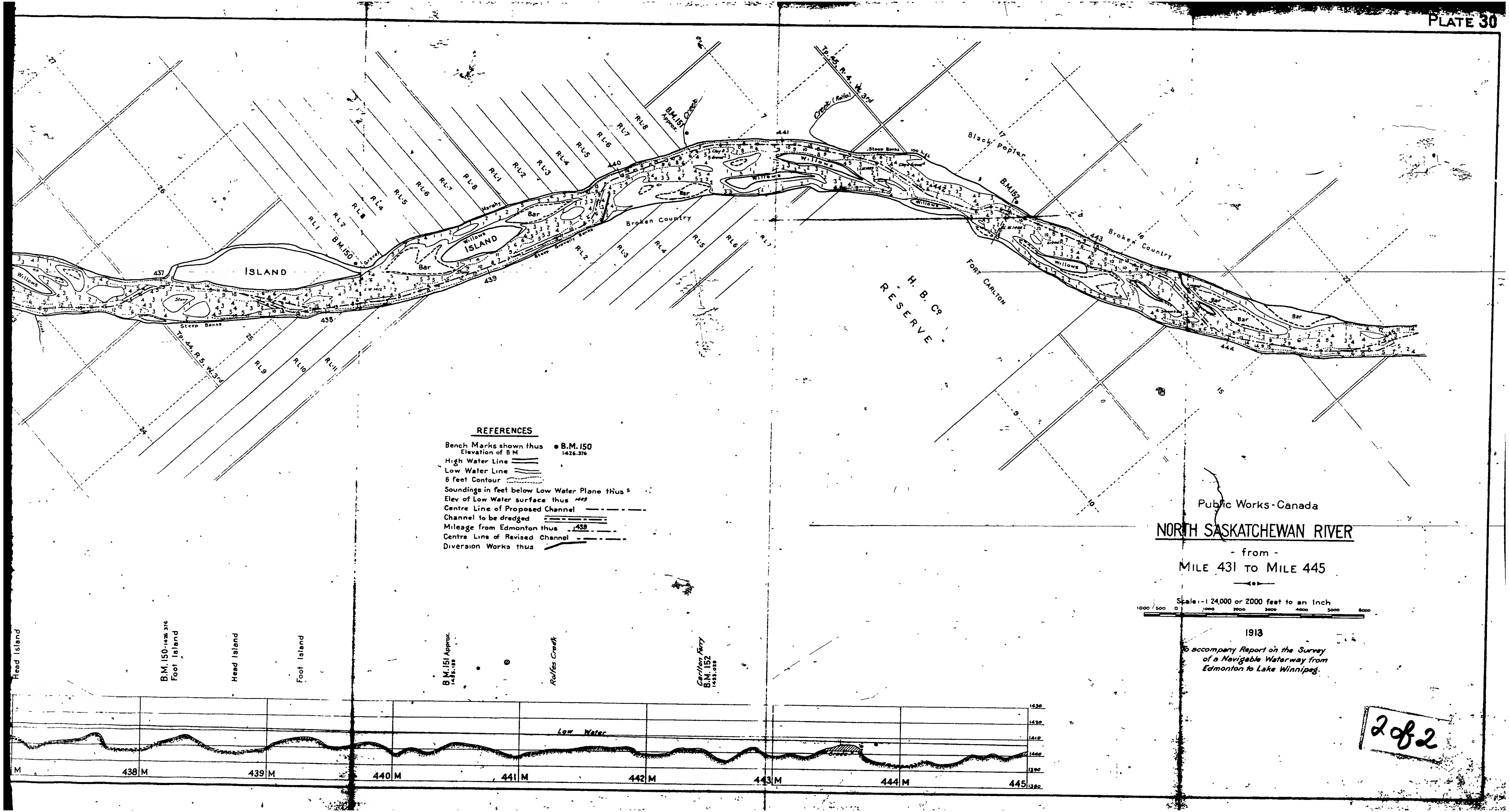
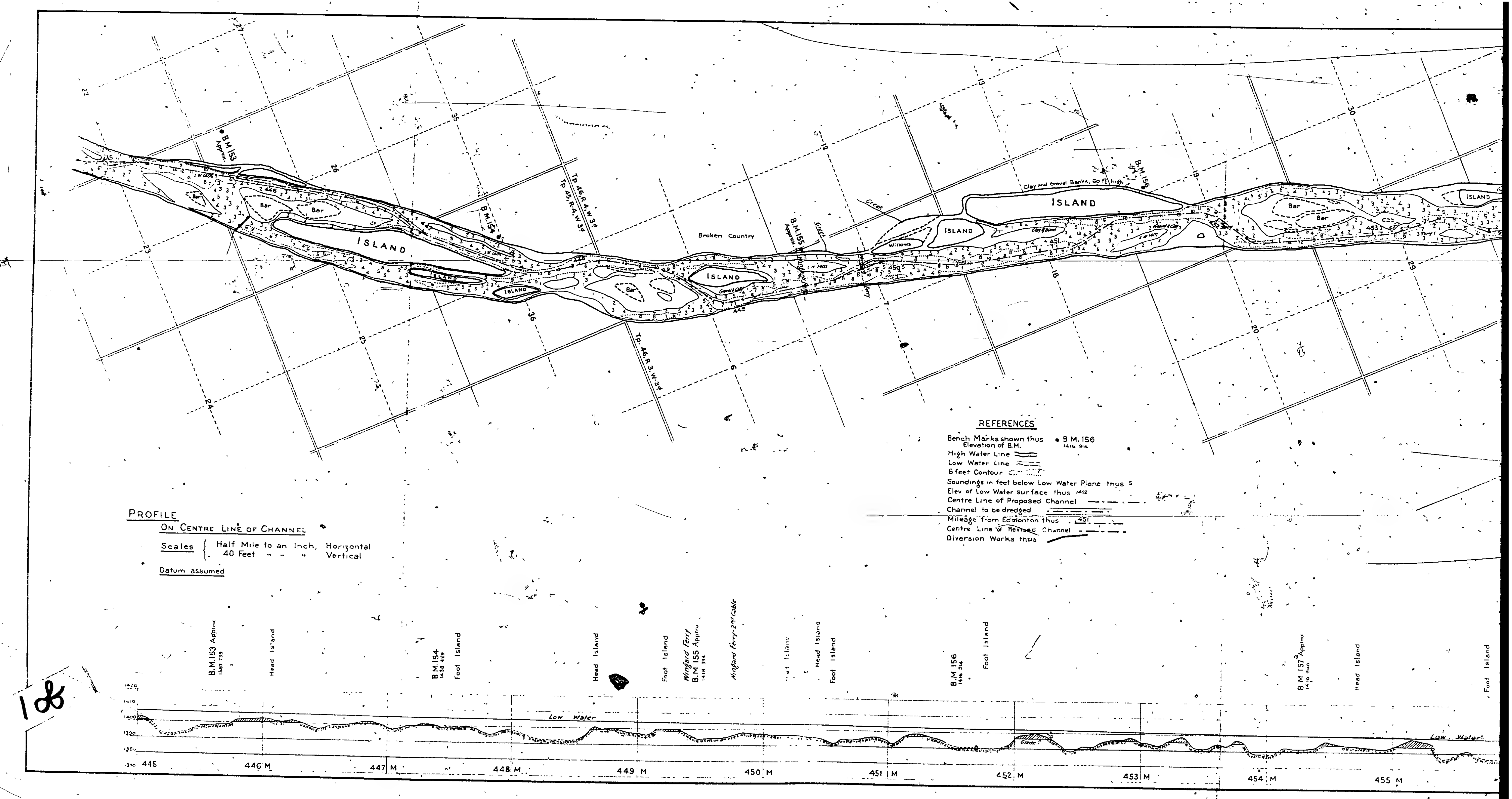
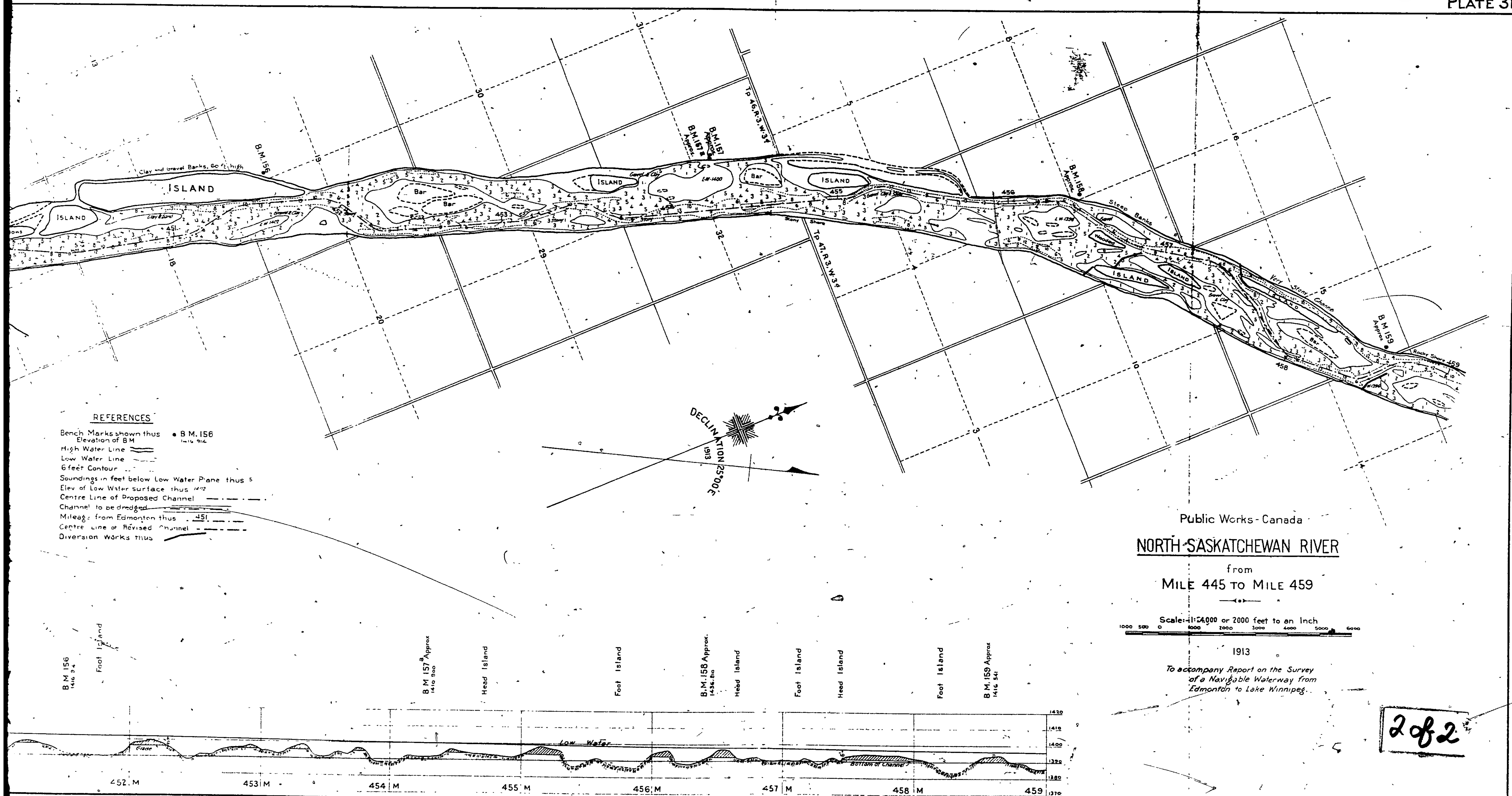


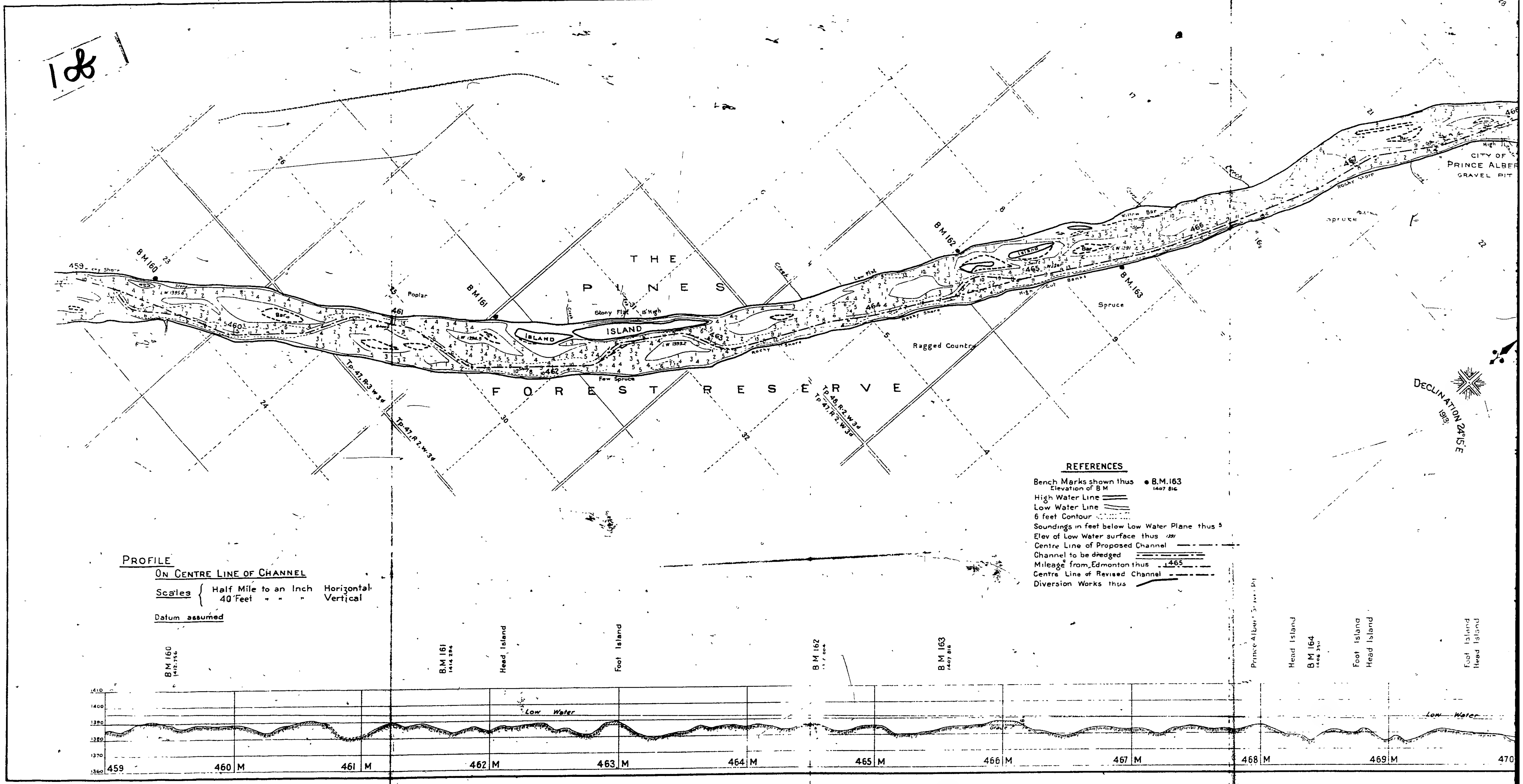
PLATE 30
ISLAND
Willows ISLAND
Bar
Broken Country
Black Poplar
H. B. Co. RESERVE
FORT CARLTON
Steep Banks
Tp. 44, R. 5, W. 3rd
Tp. 45, R. 4, W. 3rd
B.M. 150
B.M. 151 Approx.
B.M. 152
Creek (Rolfes)
REFERENCES
Bench Marks shown thus • B.M. 150
Elevation of B.M. 1426.376
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1449
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 438
Centre Line of Revised Channel
Diversion Works thus
Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 431 TO MILE 445
Scale: 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
Head Island
B.M. 150 - 1426.376 Foot Island
Head Island
Foot Island
B.M. 151 Approx. 1426.189
Rolfes Creek
Carlton Ferry B.M. 152 1433.089
Low Water
438 M
439 M
440 M
441 M
442 M
443 M
444 M
445
2 of 2

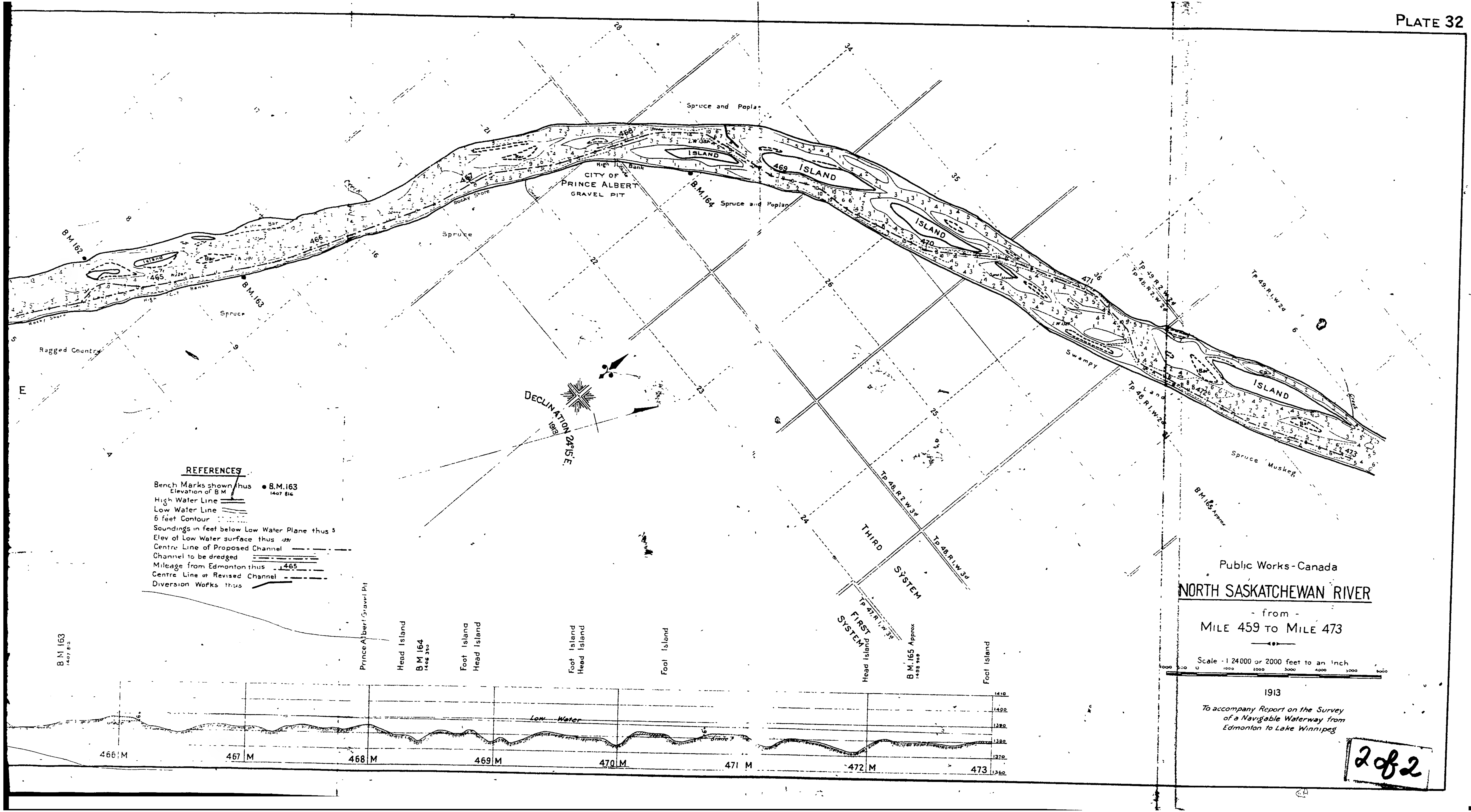


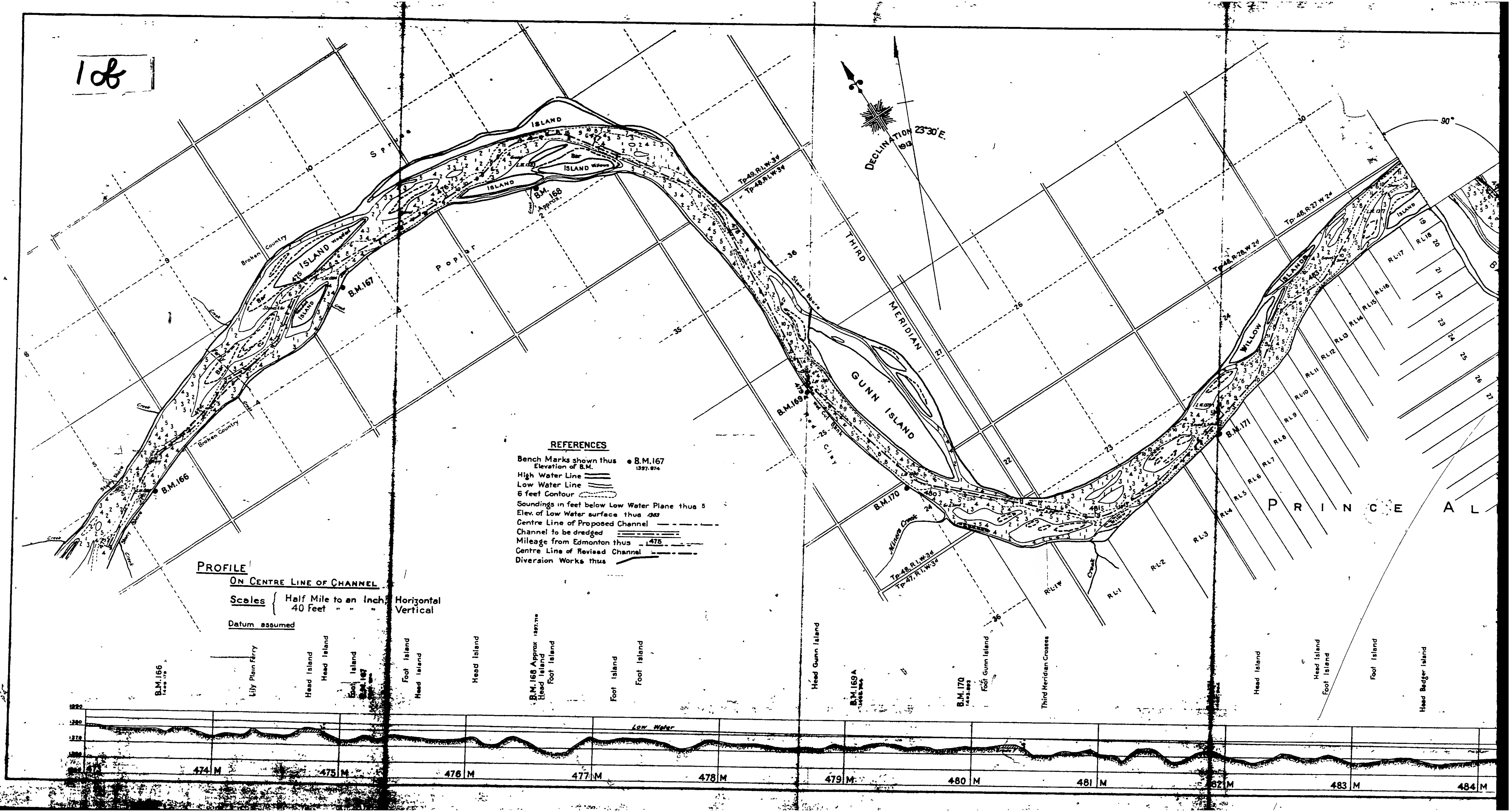
B.M.153 Approx.
B.M.154
B.M.155 Approx.
B.M.156
ISLAND
Bar
Broken Country
Willows
Creek
Clay and Gravel Banks, 60 ft. high
Tp. 46, R. 4, W. 3rd
Tp. 45, R. 4, W. 3rd
Tp. 46, R. 3, W. 3rd
REFERENCES
Bench Marks shown thus • B.M. 156
Elevation of B.M. 1416 914
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1402
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 451
Centre Line of Revised Channel
Diversion Works thus
PROFILE
On Centre Line of Channel
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M.153 Approx. 1387 739
Head Island
B.M.154 1438 429
Foot Island
Head Island
Foot Island
Winfard Ferry
B.M.155 Approx. 1418 394
Winfard Ferry 2nd Cable
Head Island
Foot Island
B.M.156 1416 914
Foot Island
B.M.157a Approx. 1410 990
Head Island
Foot Island
Low Water
Grade
445
446 M
447 M
448 M
449 M
450 M
451 M
452 M
453 M
454 M
455 M
108


REFERENCES
Bench Marks shown thus • B.M. 156
Elevation of B.M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1402
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 451
Centre Line of Revised Channel
Diversion Works thus
ISLAND
Bar
DECLINATION 25°00'E 1913
Low Water
Bottom of Channel
Public Works - Canada
NORTH SASKATCHEWAN RIVER
from
MILE 445 TO MILE 459
Scale 1:24000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.

2 of 2

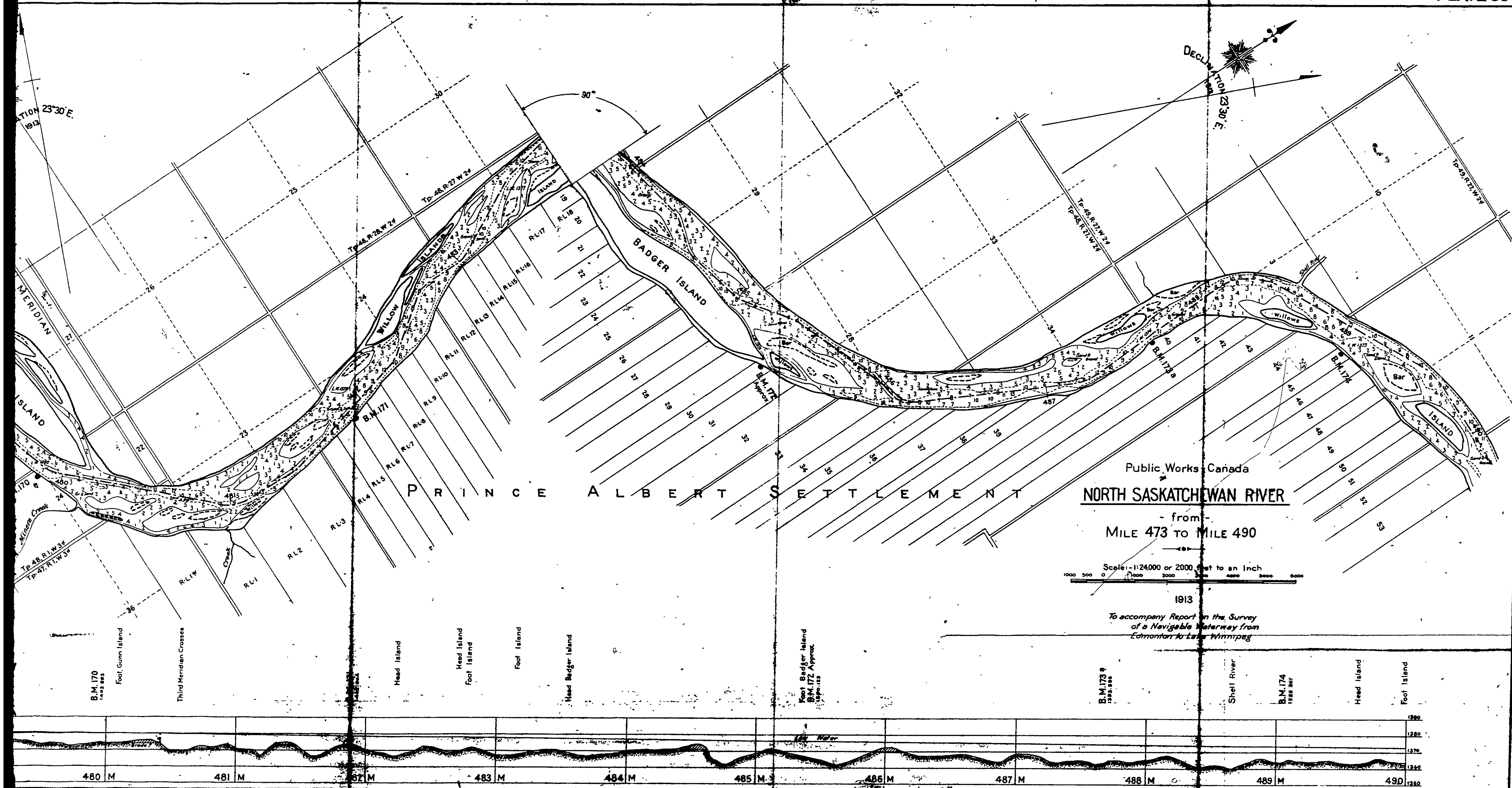

18
THE PINES FOREST RESERVE
B.M 160
B.M 161
B.M 162
B.M 163
ISLAND
Island
Bar
Poplar
Stony Flat 15' High
Few Spruce
Spruce
Ragged Country
Rocky Shore
Low Flat
High Cut Banks
Willow Bar
Creek
CITY OF PRINCE ALBERT GRAVEL PIT
Tp.47 R.3 W.3d
Tp.47 R.2 W.3d
Tp.48 R.2 W.3d
DECLINATION 1913 24°15'E
459
460
461
462
463
464
465
466
467
REFERENCES
Bench Marks shown thus • B.M.163
Elevation of B M 1407 816
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1391
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 465
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch Horizontal
40 Feet " " " Vertical
Datum assumed
B M 160 1412.756
B.M 161 1414.284
Head Island
Foot Island
B M 162
B M 163 1407 816
Prince Albert Gravel Pit
Head Island
B M 164
Foot Island
Head Island
Foot Island
Head Island
Low Water
1410
1400
1390
1380
1370
1360
459
460 M
461 M
462 M
463 M
464 M
465 M
466 M
467 M
468 M
469 M
470


Public Works - Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 459 TO MILE 473
Scale - 1 24000 or 2000 feet to an inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
2 of 2
REFERENCES
Bench Marks shown thus • B.M.163
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1391
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 465
Centre Line of Revised Channel
Diversion Works thus
CITY OF PRINCE ALBERT GRAVEL PIT
DECLINATION 24°15'E. 1913
ISLAND
Spruce and Poplar
Spruce
Ragged Country
Swampy Land
Spruce Muskeg
B.M.162
B.M.163
B.M.164
B.M.165 Approx
THIRD SYSTEM
FIRST SYSTEM
Tp 48, R.2, W.3d
Tp 48, R.1, W.3d
Tp 47, R.1, W.3d
Tp 49, R.1, W.2d
Prince Albert Gravel Pit
Head Island
Foot Island
Low Water
466 M
467 M
468 M
469 M
470 M
471 M
472 M
473

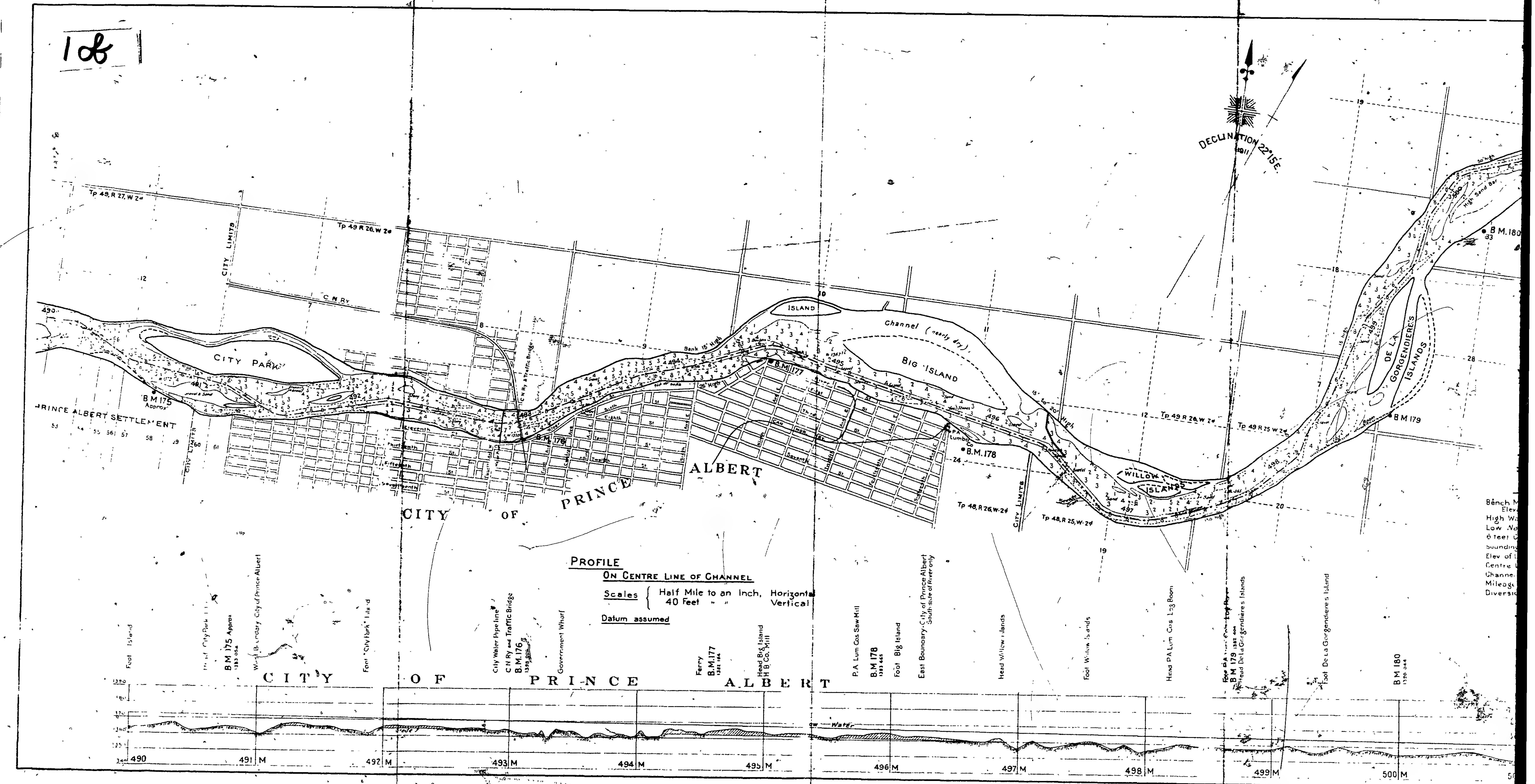


10b
ISLAND
ISLAND
ISLAND
ISLAND
ISLAND
B.M. 166
B.M. 167
B.M. 168 Approx.
B.M. 169
B.M. 170
B.M. 171
Broken Country
Stony Shore
Creek
Spruce
Poplar
Tp.49, R.1, W.3d
Tp.48, R.1, W.3d
Tp.48, R.27, W.2d
Tp.48, R.28, W.2d
Tp.48, R.1, W.3d
Tp.47, R.1, W.3d
DECLINATION 23°30'E. 1912
THIRD MERIDIAN
GUNN ISLAND
WILLOW ISLAND
Clay
Cut Bank
90°
PRINCE AL
REFERENCES
Bench Marks shown thus ● B.M.167 1357.874
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water surface thus 1363
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 475
Centre Line of Revised Channel
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M. 166
Lily Plain Ferry
Head Island
Head Island
Foot Island
B.M. 167
Foot Island
Head Island
Head Island
B.M. 168 Approx
Head Island
Foot Island
Foot Island
Foot Island
Head Gunn Island
B.M. 169A
B.M. 170
Foot Gunn Island
Third Meridian Crosses
Head Island
Head Island
Foot Island
Foot Island
Head Badger Island
Low Water
474 M
475 M
476 M
477 M
478 M
479 M
480 M
481 M
482 M
483 M
484 M

PLATE 33

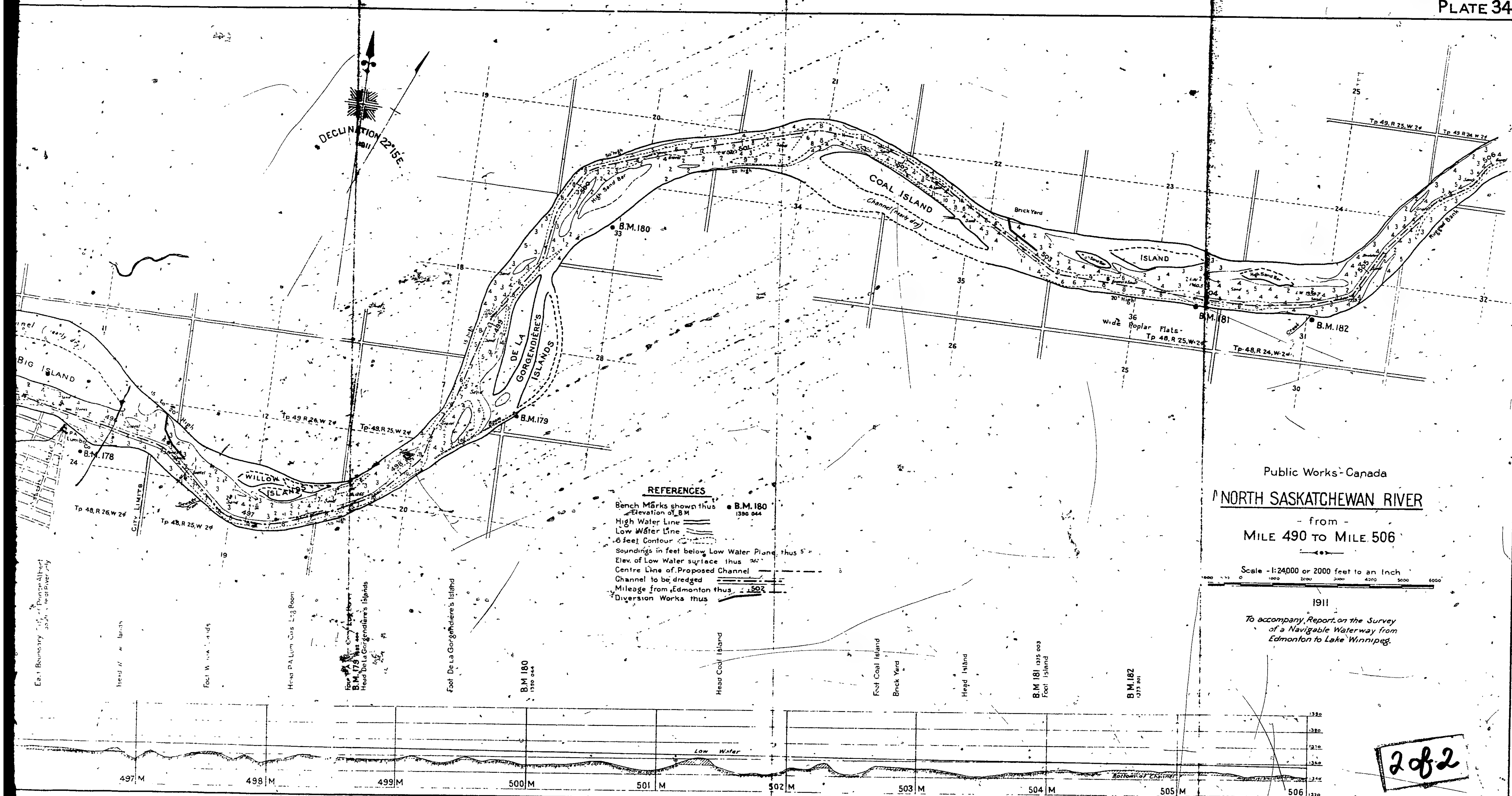

Public Works Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 473 TO MILE 490
Scale:- 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey
of a Navigable Waterway from
Edmonton to Lake Winnipeg
PRINCE ALBERT SETTLEMENT
DECLINATION 23°30'E.
BADGER ISLAND
WILLOW ISLAND
MERIDIAN
ISLAND
Willows
Bar
Shell River
Miners Creek
Creek
B.M.170
B.M.171
B.M.172 Approx.
B.M.173 a
B.M.174
Tp-48, R-28, W 2d
Tp-48, R-27, W 2d
Tp-49, R-27, W 2d
Tp-48, R-1, W 3d
Tp-47, R-1, W 3d
Foot Gunn Island
Third Meridian Crosses
Head Island
Head Island
Foot Island
Foot Island
Head Badger Island
Foot Badger Island
B.M.172 Approx.
Shell River
Head Island
Foot Island
Low Water
480 M
481 M
482 M
483 M
484 M
485 M
486 M
487 M
488 M
489 M
490

10b



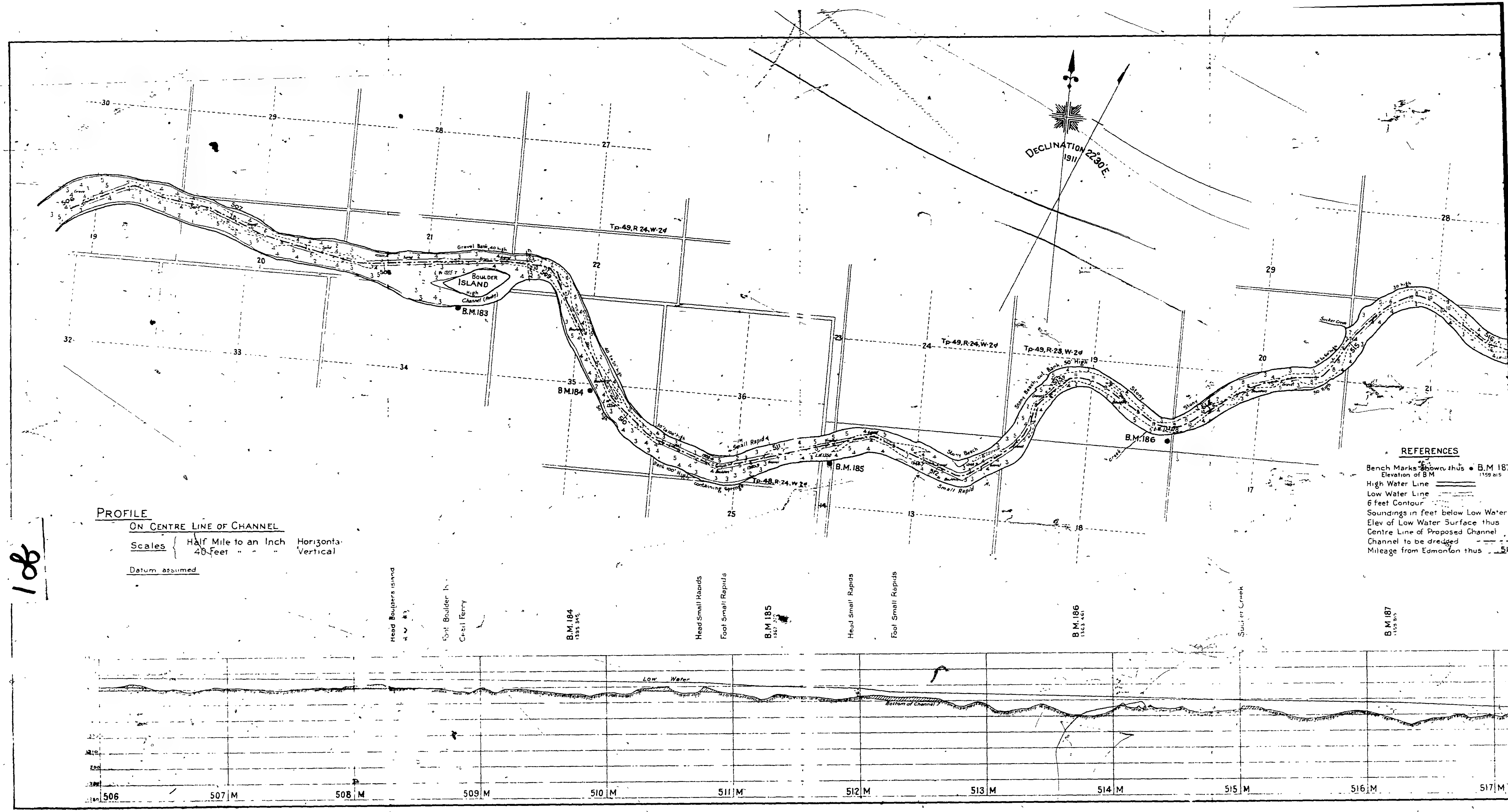
DECLINATION 22°15'E.
1911
CITY PARK
PRINCE ALBERT SETTLEMENT
B.M. 175 Approx
CITY LIMITS
C N RY
Tp 49 R 27 W 2d
Tp 49 R 26 W 2d
Tp 49 R 25 W 2d
Tp 48 R 26 W 2d
Tp 48 R 25 W 2d
ISLAND
Channel (nearly dry)
BIG ISLAND
B.M. 176
B.M. 177
B.M. 178
B.M. 179
B.M. 180
WILLOW ISLANDS
DE LA GORGENDIERES ISLANDS
CITY OF PRINCE ALBERT
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " Vertical
Datum assumed
Foot Island
Head City Park Island
B.M. 175 Approx
West Boundary City of Prince Albert
Foot "City Park" Island
City Water Pipe Line
C N Ry and Traffic Bridge
B.M. 176
Government Wharf
Ferry
B.M. 177
Head Big Island
H B Co. Mill
P.A. Lum Cos Saw Mill
B.M. 178
Foot Big Island
East Boundary City of Prince Albert South side of River only
Head Willow Islands
Foot Willow Islands
Head P.A. Lum Cos Log Boom
B.M. 179
Head De La Gorgendieres Islands
Foot De La Gorgendieres Island
B.M. 180
CITY OF PRINCE ALBERT
Low Water
490
491 M
492 M
493 M
494 M
495 M
496 M
497 M
498 M
499 M
500 M

PLATE 34



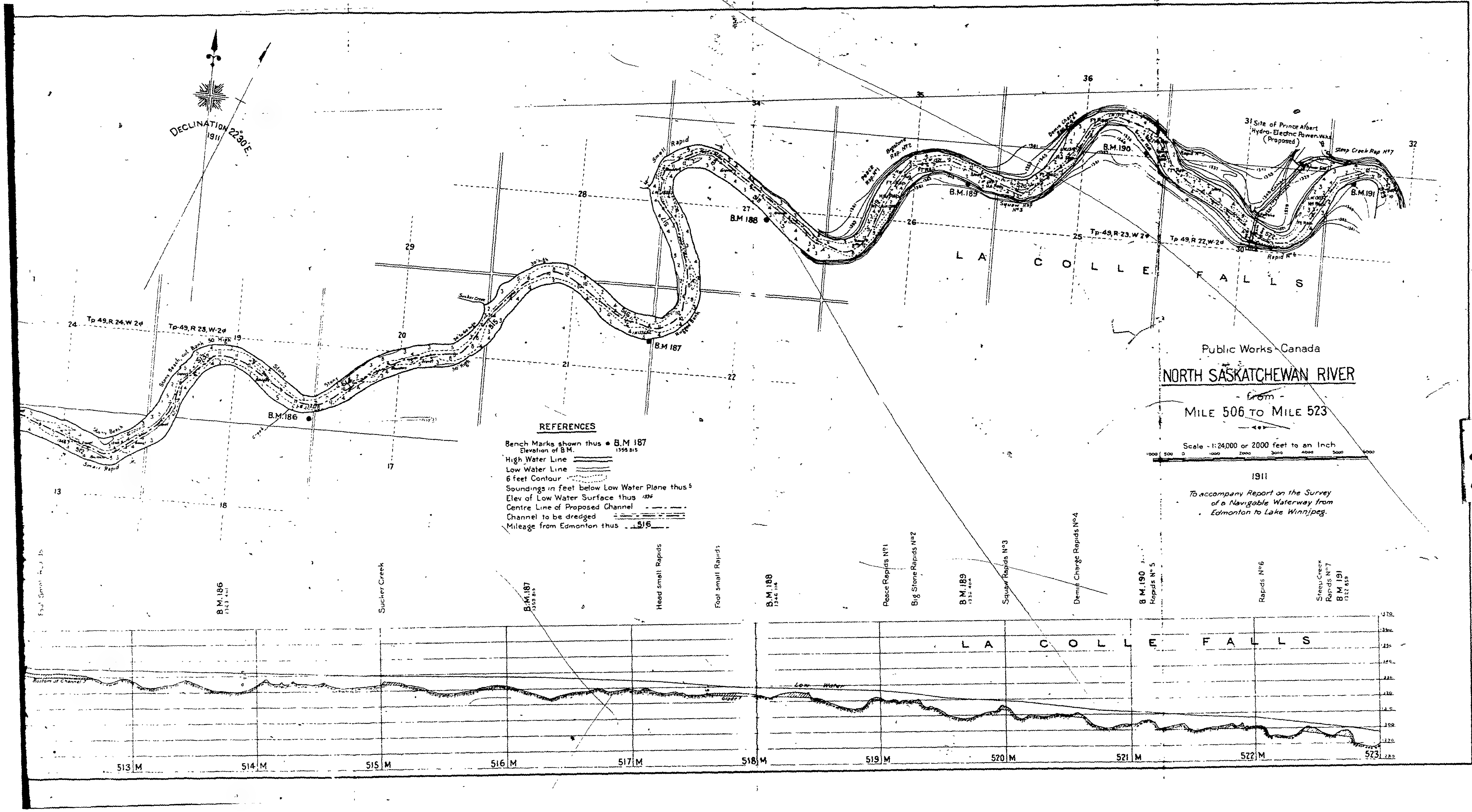
2 of 2

18



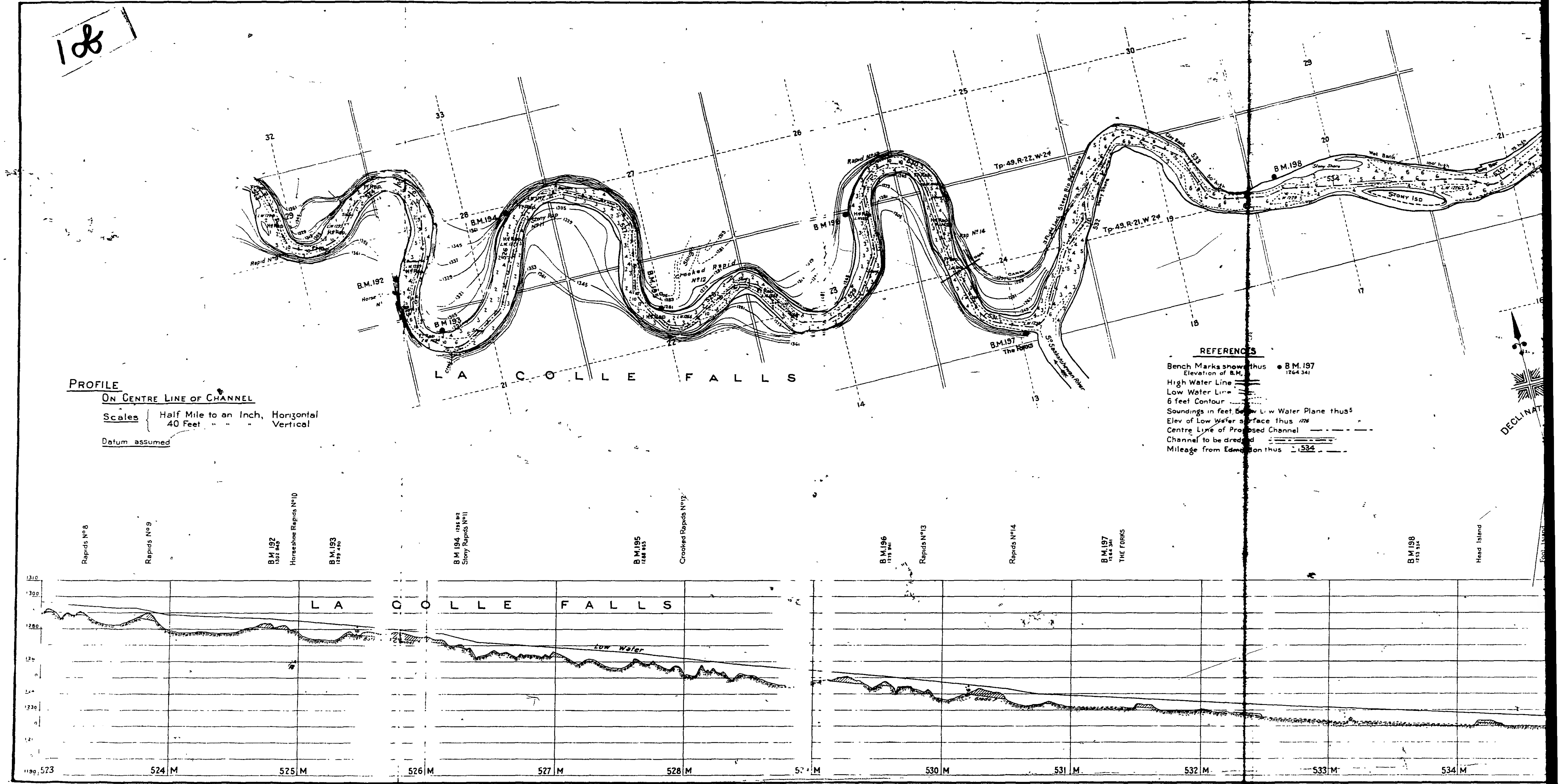
DECLINATION 22°30'E.
1911
Tp-49, R 24, W 2d
Tp-49, R 24, W 2d
Tp-49, R 23, W 2d
Tp-48, R 24, W 2d
BOULDER ISLAND
Gravel Bank 40 high
B.M.183
B.M.184
B.M.185
B.M.186
Small Rapid
Stony Beach
Sucker Creek
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B.M. 187
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus
Head Boulders Island
Foot Boulder Is.
Creil Ferry
Head Small Rapids
Foot Small Rapids
Low Water
Bottom of Channel
506
507 M
508 M
509 M
510 M
511 M
512 M
513 M
514 M
515 M
516 M
517 M

PLATE 35


Public Works-Canada
NORTH SASKATCHEWAN RIVER
- from -
MILE 506 TO MILE 523
Scale - 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus ● B.M 187
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water Surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 516
DECLINATION 22°30'E 1911
LA COLLE FALLS
Site of Prince Albert Hydro-Electric Power Wks (Proposed)
Tp 49, R 24, W 2d
Tp 49, R 23, W 2d
Tp 49, R 22, W 2d
B.M.186
B.M 187
B.M 188
B.M.189
B.M.190
B.M.191
Sucker Creek
Head small Rapids
Foot small Rapids
Peace Rapids No1
Big Stone Rapids No2
Squaw Rapids No3
Demie Charge Rapids No4
Rapids No5
Rapids No6
Steep Creek Rapids No7
Low Water
513 M
514 M
515 M
516 M
517 M
518 M
519 M
520 M
521 M
522 M
523

282

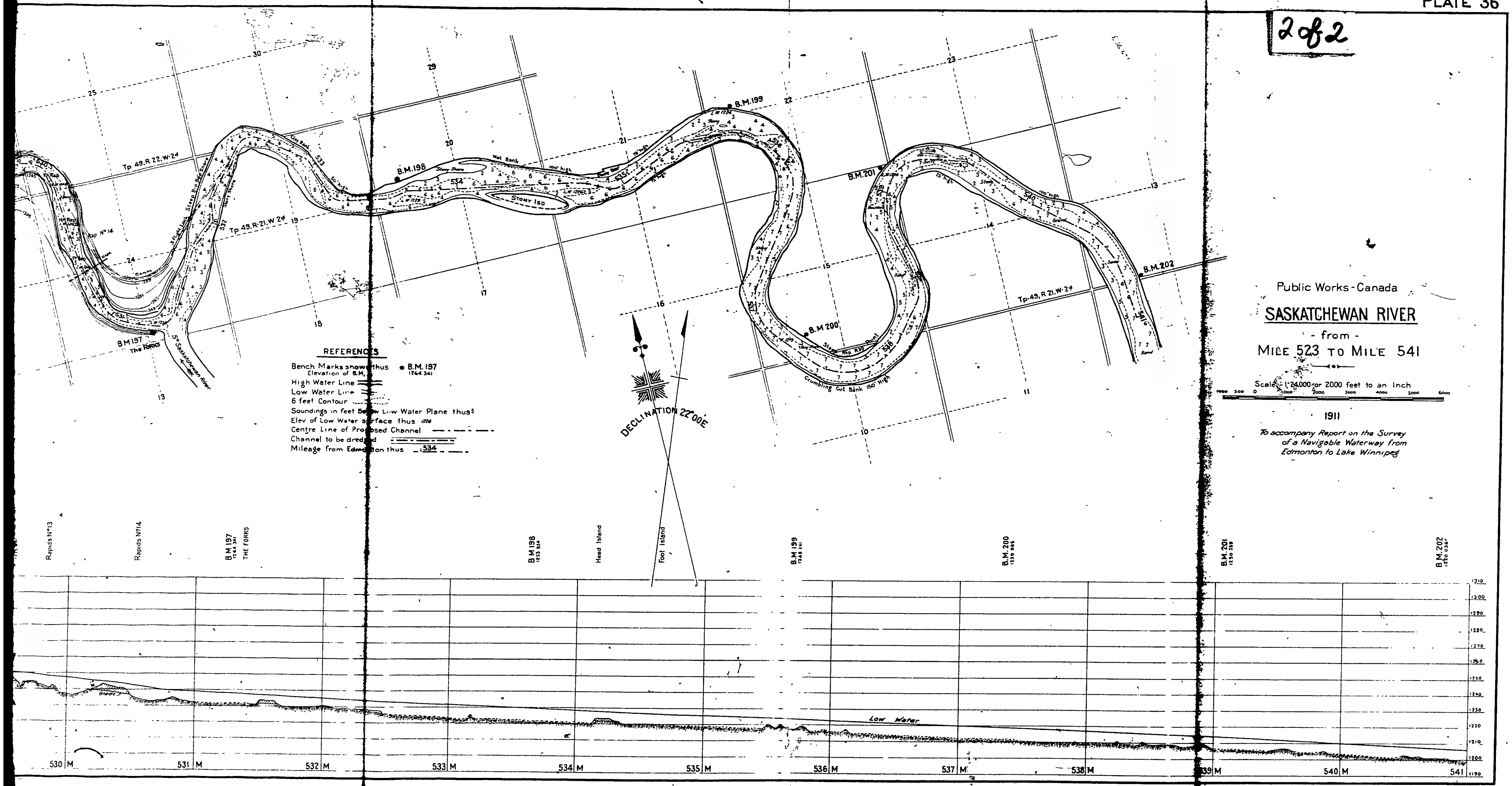
108

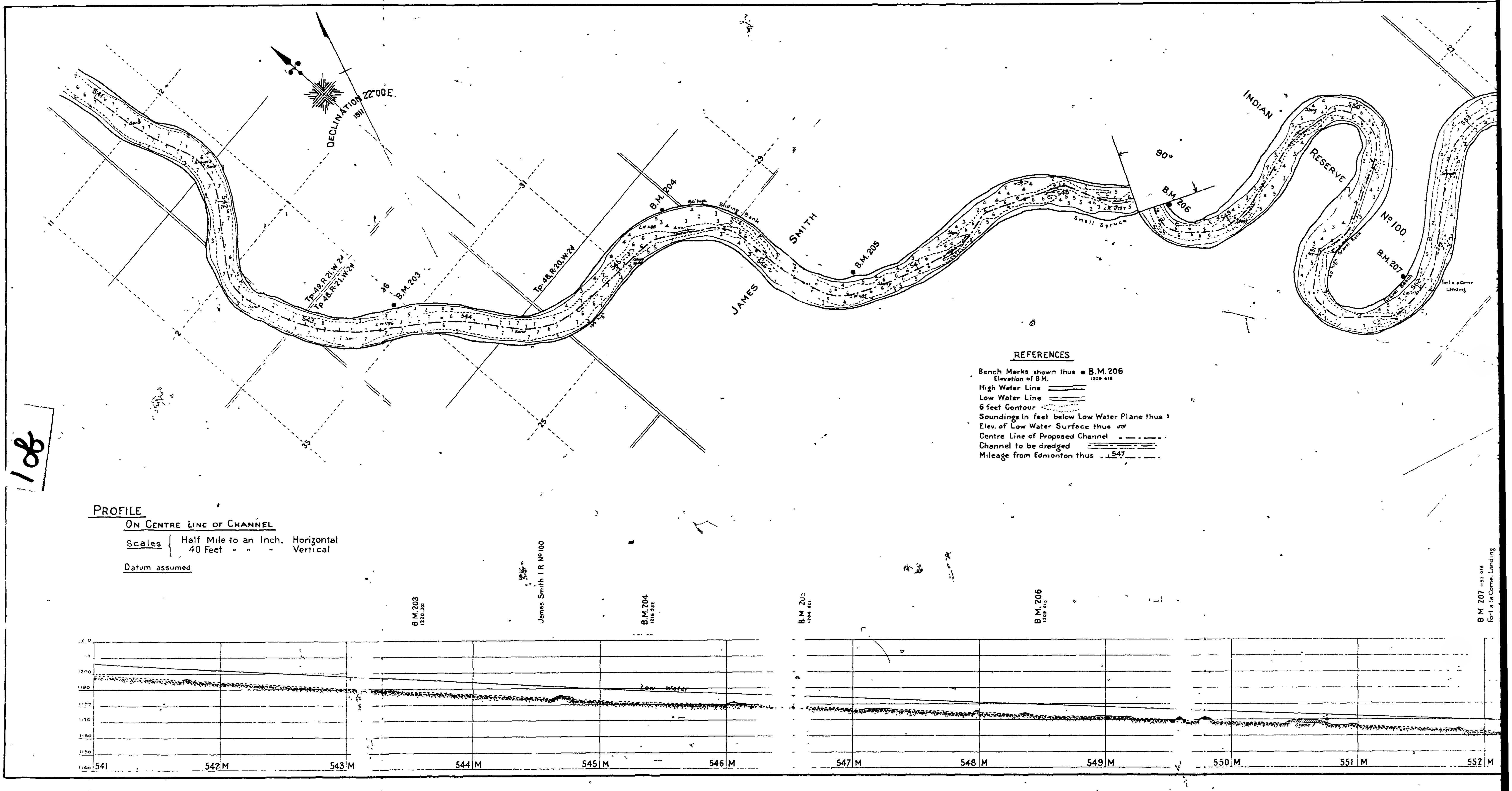


LA COLLE FALLS
Tp. 49, R. 22, W. 4th
Tp. 49, R. 21, W. 4th
B.M. 192
B.M. 193
B.M. 194
B.M. 195
B.M. 196
B.M. 197
B.M. 198
Crooked Rapid No 12
Rapid No 14
The Forks
So. Saskatchewan River
Stony Isd
Wet Bank
PROFILE
On Centre Line of Channel
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus ● B.M. 197
Elevation of B.M. 1264 341
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1226
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 534
DECLINAT
Rapids No 8
Rapids No 9
B.M. 192
Horseshoe Rapids No 10
B.M. 193
B.M. 194
Stony Rapids No 11
B.M. 195
Crooked Rapids No 12
B.M. 196
Rapids No 13
Rapids No 14
B.M. 197
THE FORKS
B.M. 198
Head Island
Foot Island
LA COLLE FALLS
Low Water
Grade
523
524 M
525 M
526 M
527 M
528 M
530 M
531 M
532 M
533 M
534 M

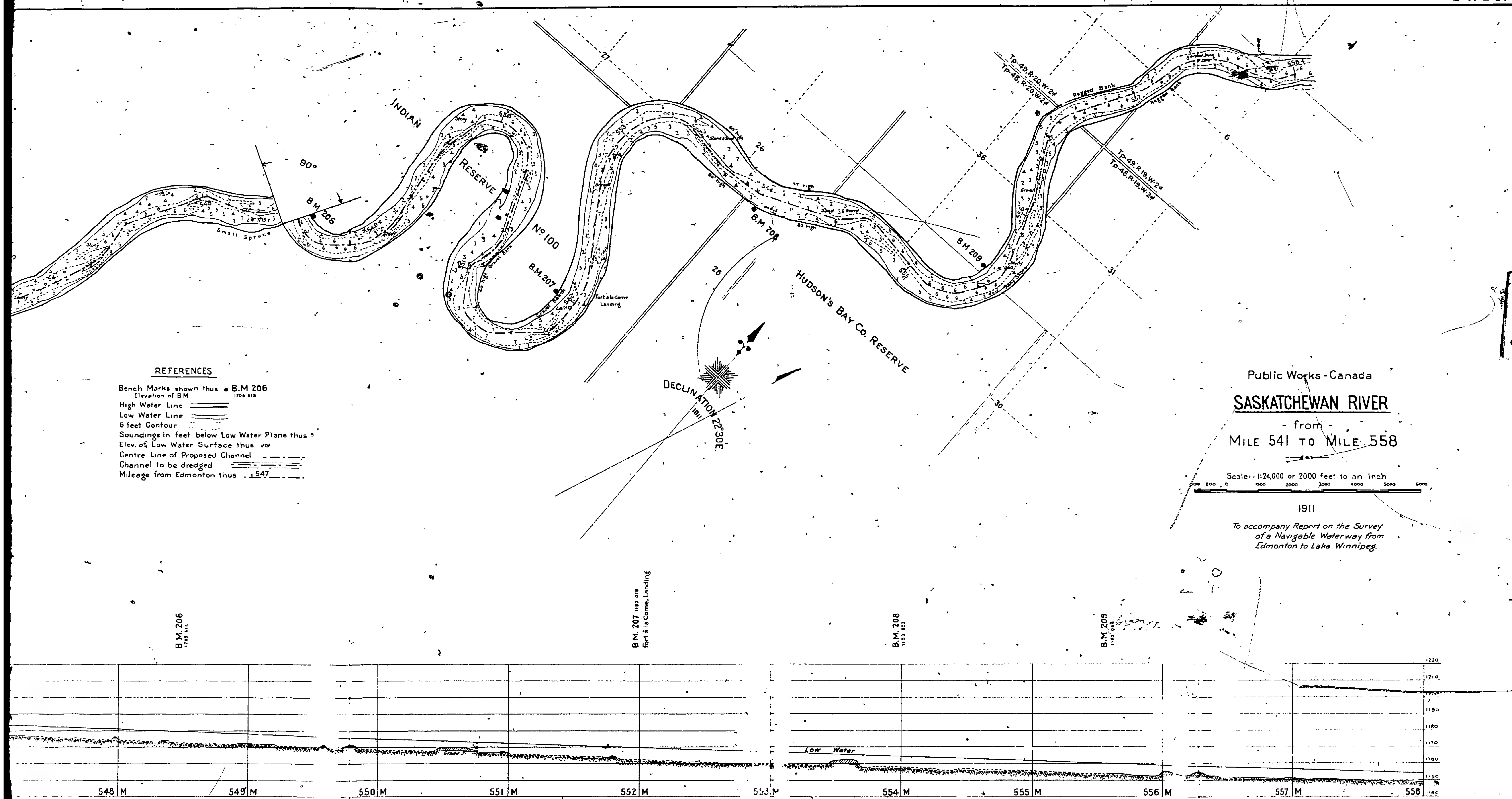
PLATE 36

2 of 2



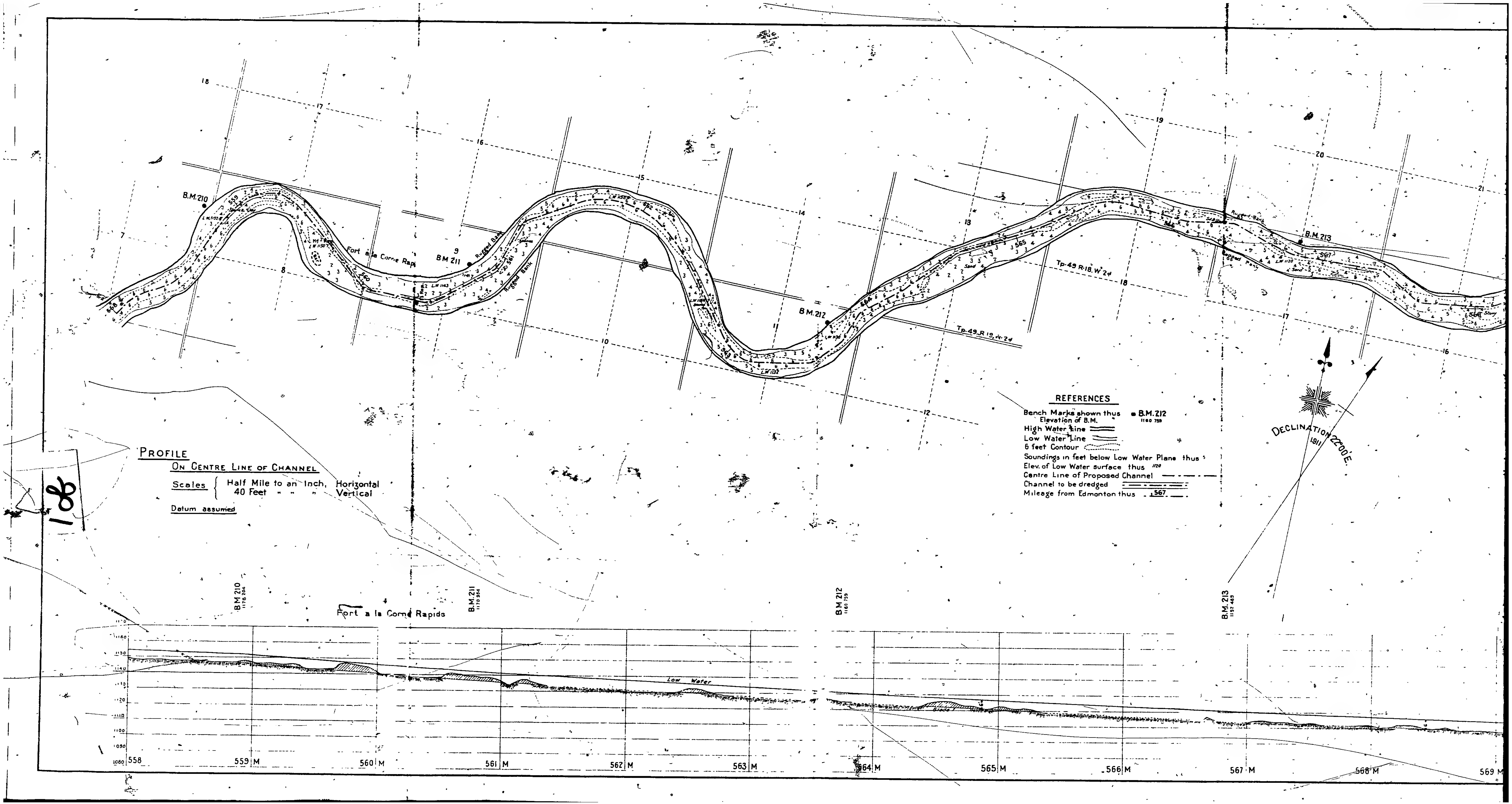


108
DECLINATION 22°00E.
1911
JAMES SMITH
INDIAN RESERVE No 100
Tp.49.R.21.W.2d
Tp.48.R.21.W.2d
Tp.48.R.20.W.2d
B.M.203
B.M.204
B.M.205
B.M.206
B.M.207
Sliding Bank
Small Spruce
90°
Fort a la Corne Landing
REFERENCES
Bench Marks shown thus • B.M.206
Elevation of B.M. 1209.618
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water Surface thus 1179
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 547
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M.203 1220.301
James Smith I R No100
B.M.204 1215.932
B.M.205 1206.621
B.M.206 1209.618
B.M.207 1192.019 Fort a la Corne Landing
Low Water
Grade
541
542 M
543 M
544 M
545 M
546 M
547 M
548 M
549 M
550 M
551 M
552 M

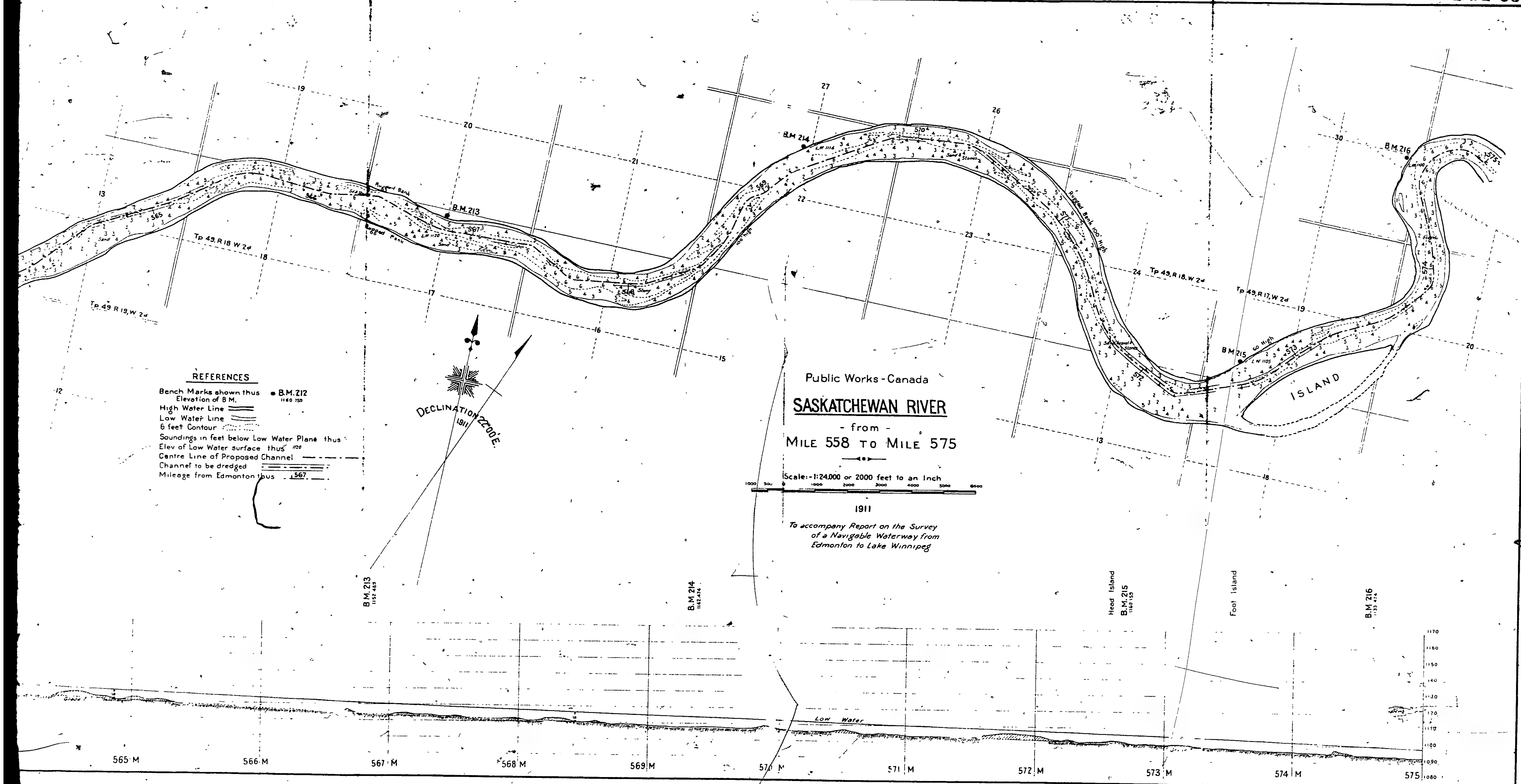


INDIAN RESERVE No 100
HUDSON'S BAY CO. RESERVE
90°
B.M 206
B.M 207
B.M 208
B.M 209
Small Spruce
Fort à la Corne Landing
Ragged Bank
Tp.49.R.20.W.2d
Tp.48.R.20.W.2d
Tp.49.R.19.W.2d
Tp.48.R.19.W.2d
DECLINATION 22°30'E.
1911
REFERENCES
Bench Marks shown thus • B.M 206
Elevation of B.M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water Surface thus 1179
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 547
Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 541 TO MILE 558
Scale:- 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
B.M. 207 Fort à la Corne, Landing
Low Water
548 M
549 M
550 M
551 M
552 M
553 M
554 M
555 M
556 M
557 M
558

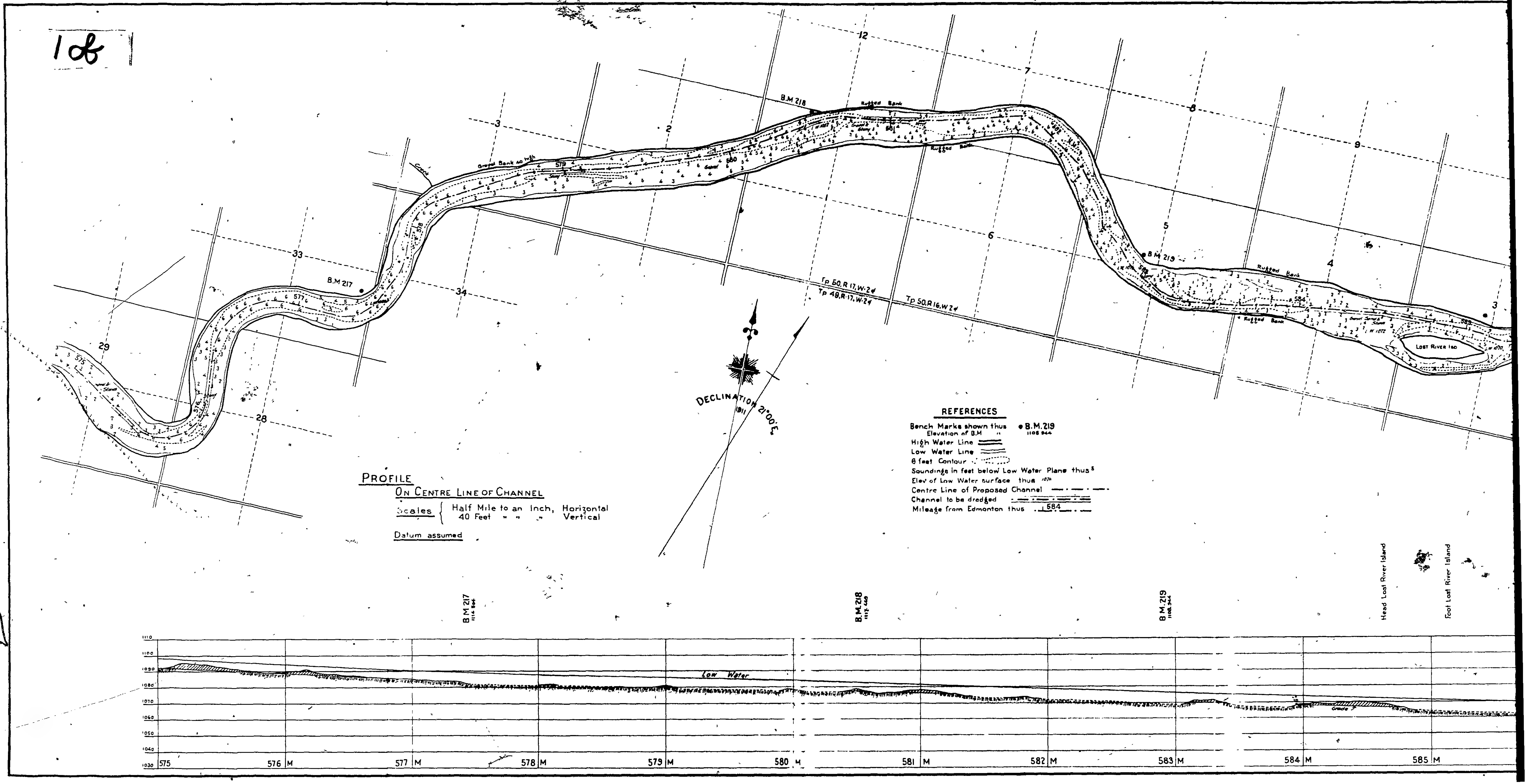
282



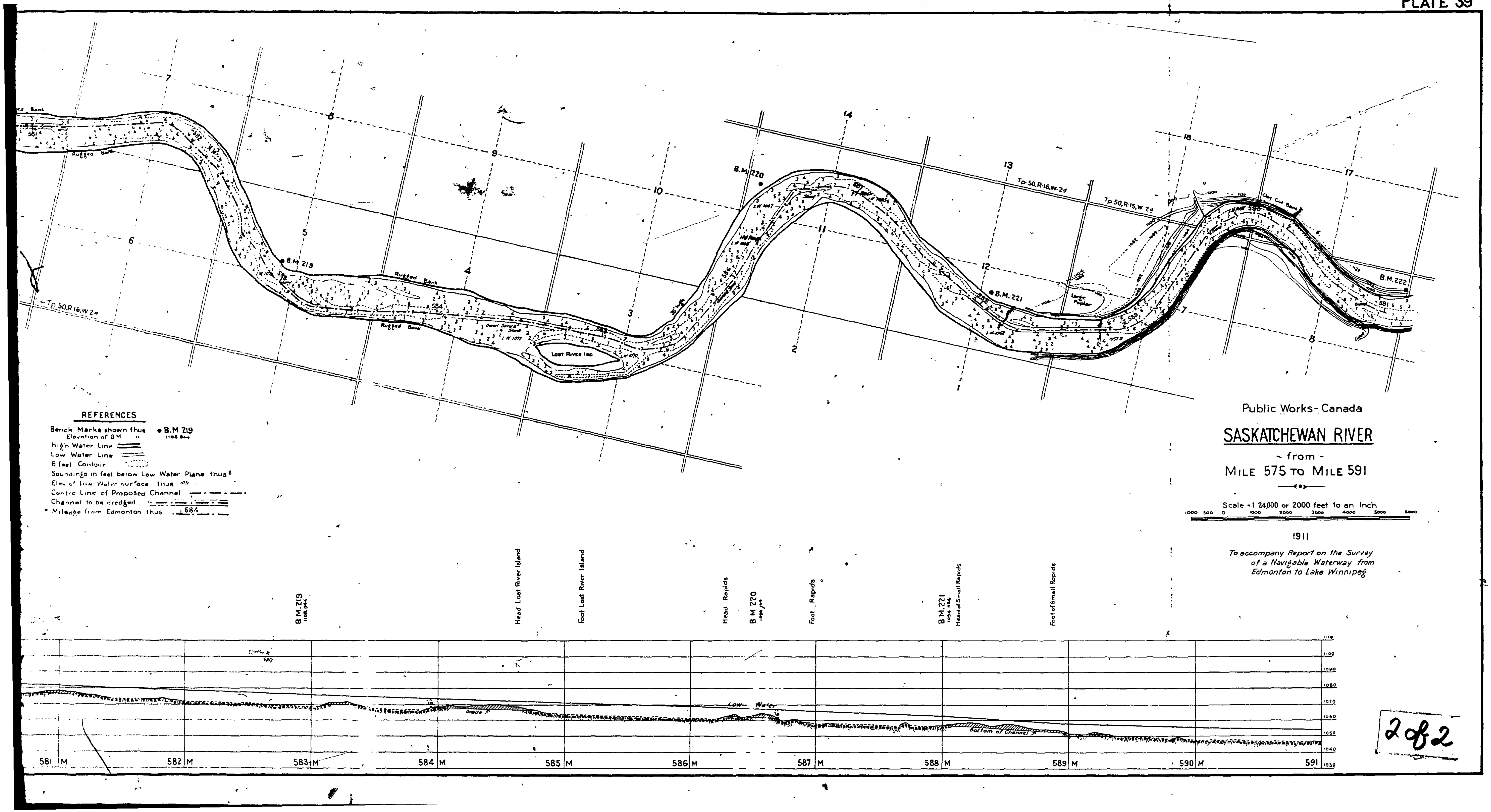
108
B.M. 210
Fort à la Corne Rapids
B.M. 211
Rugged Bank
B.M. 212
B.M. 213
Tp. 49 R. 18 W. 2d
Tp. 49 R. 19 W. 2d
REFERENCES
Bench Marks shown thus • B.M. 212
Elevation of B.M. 1160 759
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water surface thus 1120
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 567
DECLINATION 22°00' E.
1911
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Fort a la Corne Rapids
Low Water
558
559 M
560 M
561 M
562 M
563 M
564 M
565 M
566 M
567 M
568 M
569 M


REFERENCES
Bench Marks shown thus • B.M. 212
Elevation of B.M. 1160.759
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus 1120
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 567
DECLINATION 22°00' E.
1911
Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 558 TO MILE 575
Scale:- 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
ISLAND
B.M. 213
B.M. 214
B.M. 215
B.M. 216
Tp 49, R 19, W 2d
Tp 49, R 18, W 2d
Tp 49, R 17, W 2d
Rugged Bank
Head Island
Foot Island
Low Water
565 M
566 M
567 M
568 M
569 M
570 M
571 M
572 M
573 M
574 M
575

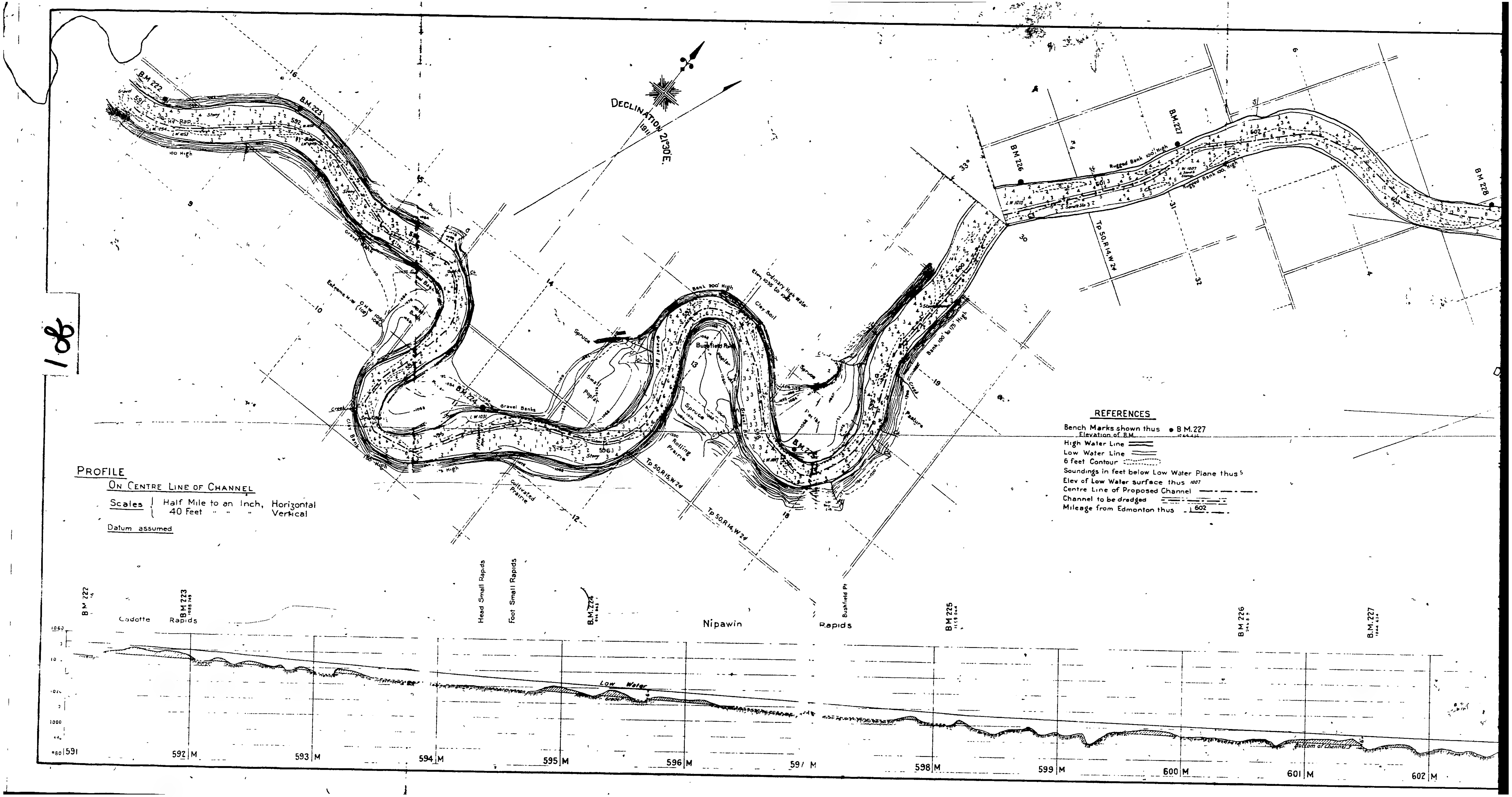
10b



B.M. 217
B.M. 218
B.M. 219
Rugged Bank
Gravel Bank
Lost River Isd
Tp 50, R 17, W 4th
Tp 49, R 17, W 4th
Tp 50, R 16, W 4th
Declination 21°00' E.
1911
REFERENCES
Bench Marks shown thus
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus
PROFILE
On Centre Line of Channel
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Head Lost River Island
Foot Lost River Island
Low Water
Grade
575
576 M
577 M
578 M
579 M
580 M
581 M
582 M
583 M
584 M
585 M

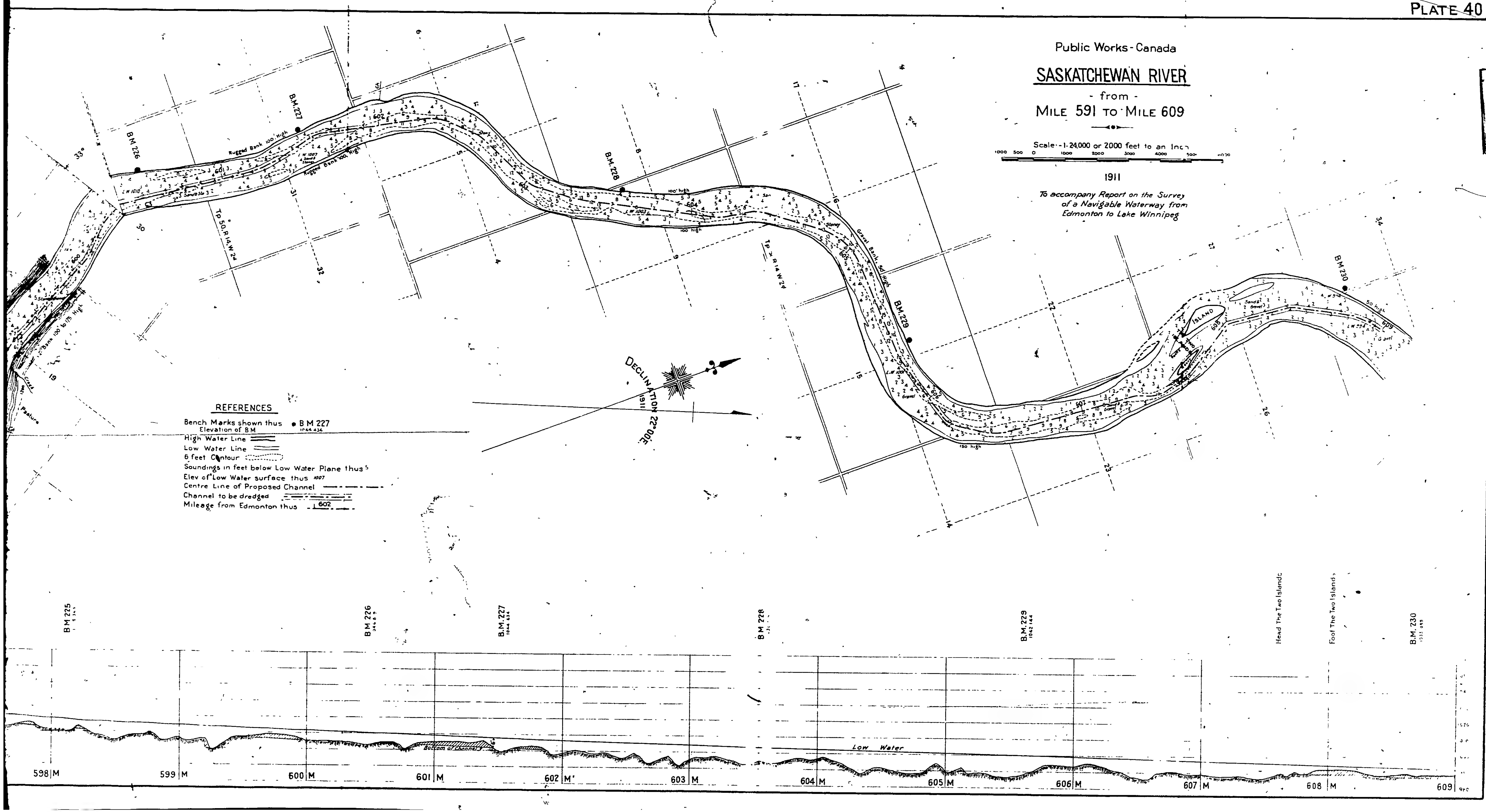

Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 575 TO MILE 591
Scale =1 24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus ● B.M. 219
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 584
B.M. 219
B.M. 220
B.M. 221
B.M. 222
Rugged Bank
Lost River Isd
Tp 50, R.16, W. 2d
Tp 50, R.15, W. 2d
Clay Cut Bank
Large Poplar
B.M. 219
Head Lost River Island
Foot Lost River Island
Head Rapids
B.M. 220
Foot Rapids
B.M. 221
Head of Small Rapids
Foot of Small Rapids
Low Water
Bottom of Channel
581 M
582 M
583 M
584 M
585 M
586 M
587 M
588 M
589 M
590 M
591

2 of 2

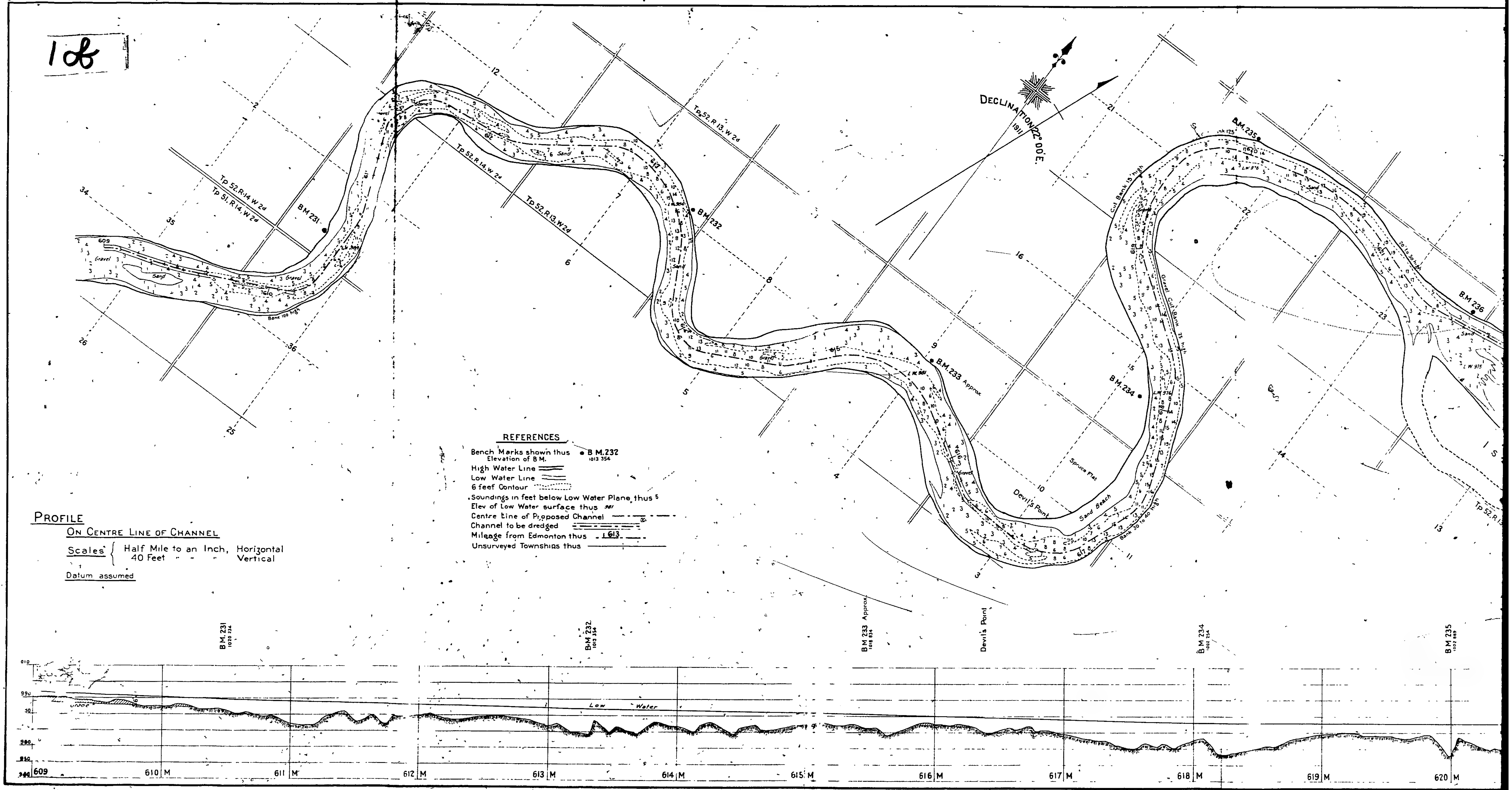


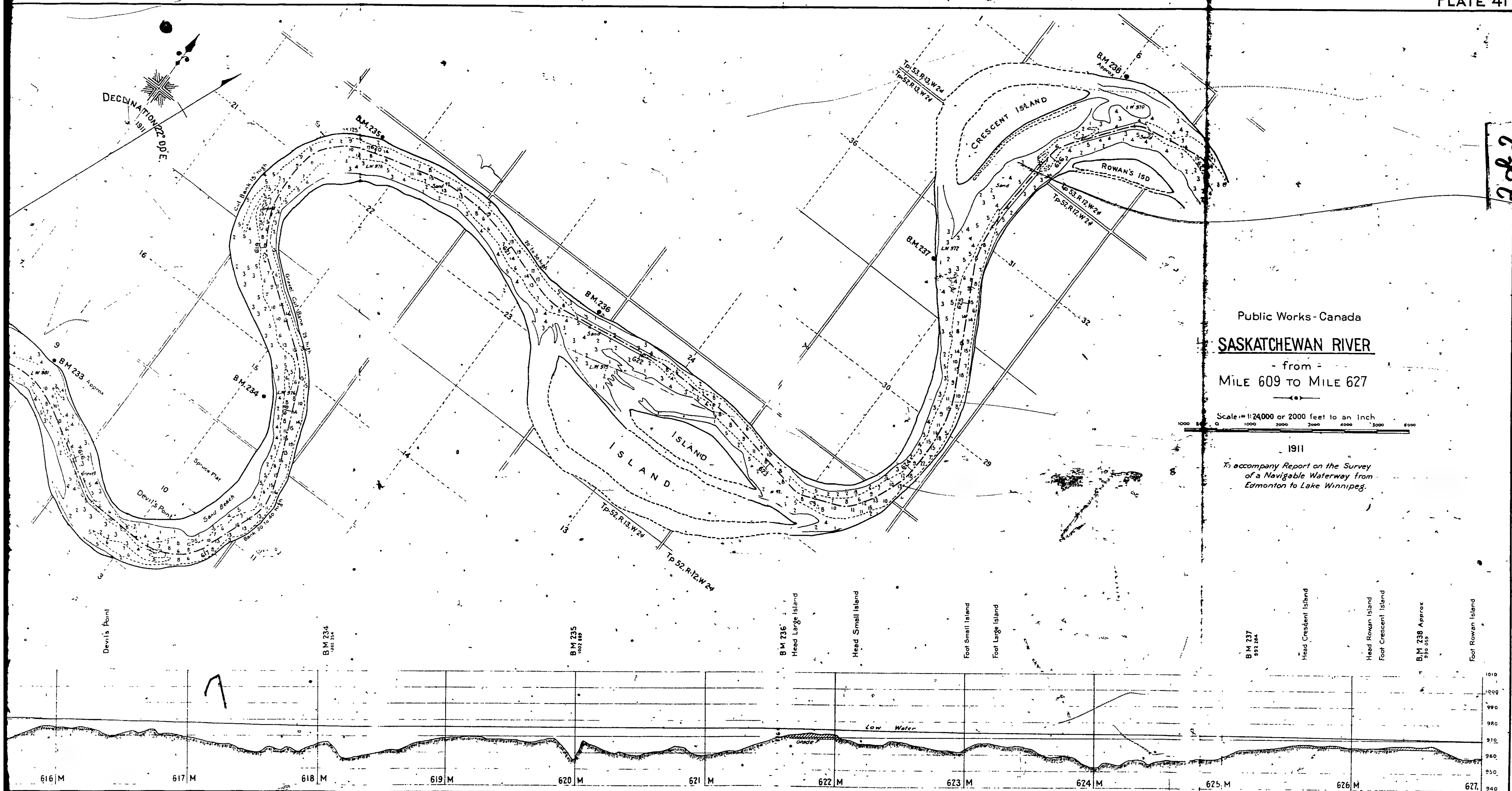
108
DECLINATION 21°30'E. 1911
B.M. 222
B.M. 223
B.M. 224
B.M. 225
B.M. 226
B.M. 227
B.M. 228
Gravel Banks
Bushfield Pt.
Spruce
Small Poplar
Rolling Prairie
Cultivated Prairie
Clay Soil
Bank 200' High
Ordinary High Water Elev 1035 to 1040
Bank 100' to 175' High
Rugged Bank 100' High
Pasture
Tp 50, R 15, W 2d
Tp 50, R 14, W 2d
REFERENCES
Bench Marks shown thus • B.M. 227
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 1007
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 602
PROFILE
On Centre Line of Channel
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Cadotte Rapids
Head Small Rapids
Foot Small Rapids
Nipawin Rapids
Bushfield Pt
Low Water
Grade
Bottom of Channel
1060
1000
591
592 M
593 M
594 M
595 M
596 M
597 M
598 M
599 M
600 M
601 M
602 M

PLATE 40

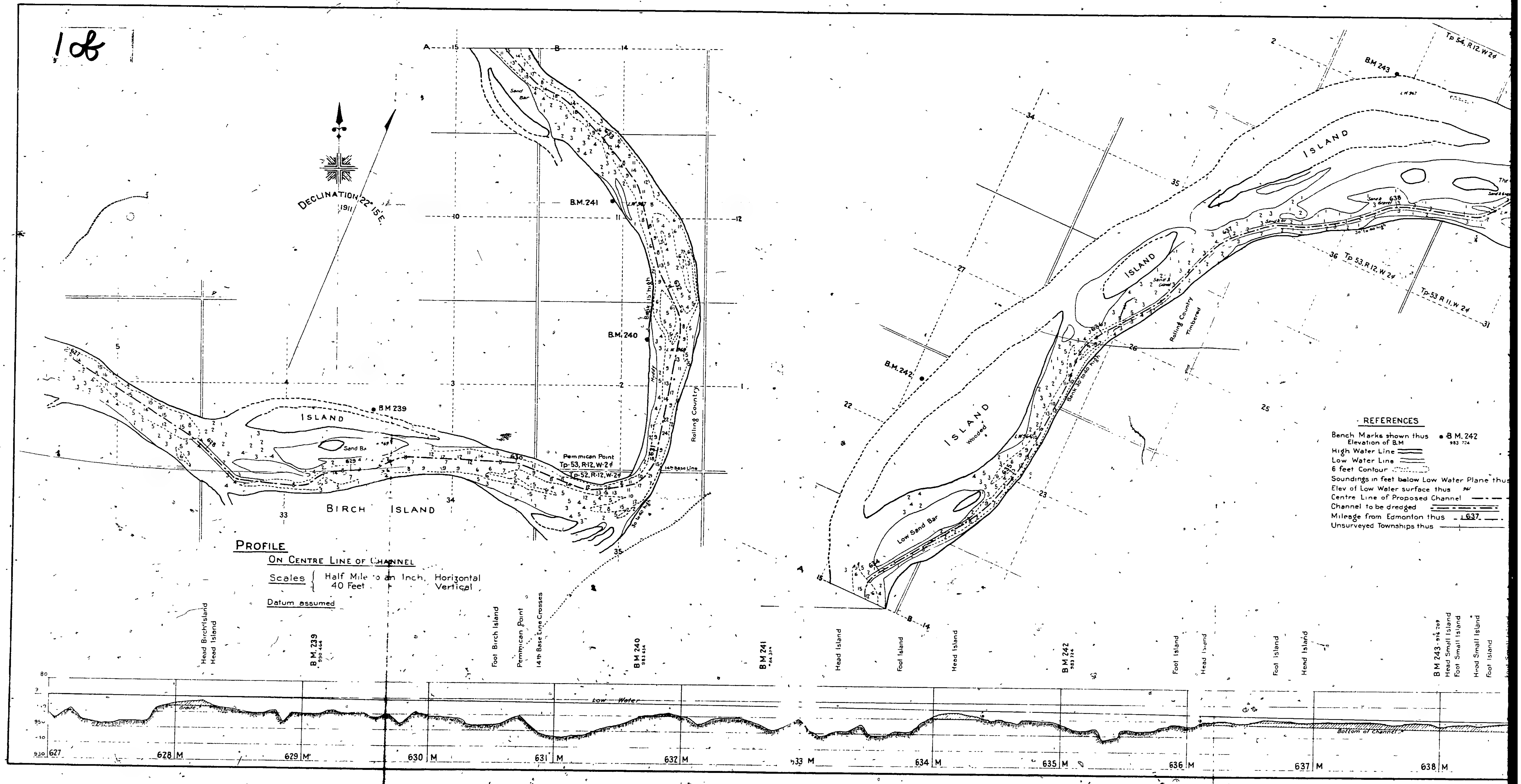


2 of 2


1 of
DECLINATION 22° 00' E.
1911
Tp 52, R 14, W 2d
Tp 51, R 14, W 2d
Tp 52, R 13, W 2d
B.M. 231
B.M. 232
B.M. 233 Approx
B.M. 234
B.M. 235
B.M. 236
Gravel
Sand
Bank 100 high
Cut Bank 15 high
Gravel Cut Bank 35 high
Spruce Flat
Devil's Point
Sand Beach
Bank 30 to 40 high
REFERENCES
Bench Marks shown thus • B.M. 232
Elevation of B.M. 1013 354
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 981
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 613
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Low Water
609
610 M
611 M
612 M
613 M
614 M
615 M
616 M
617 M
618 M
619 M
620 M

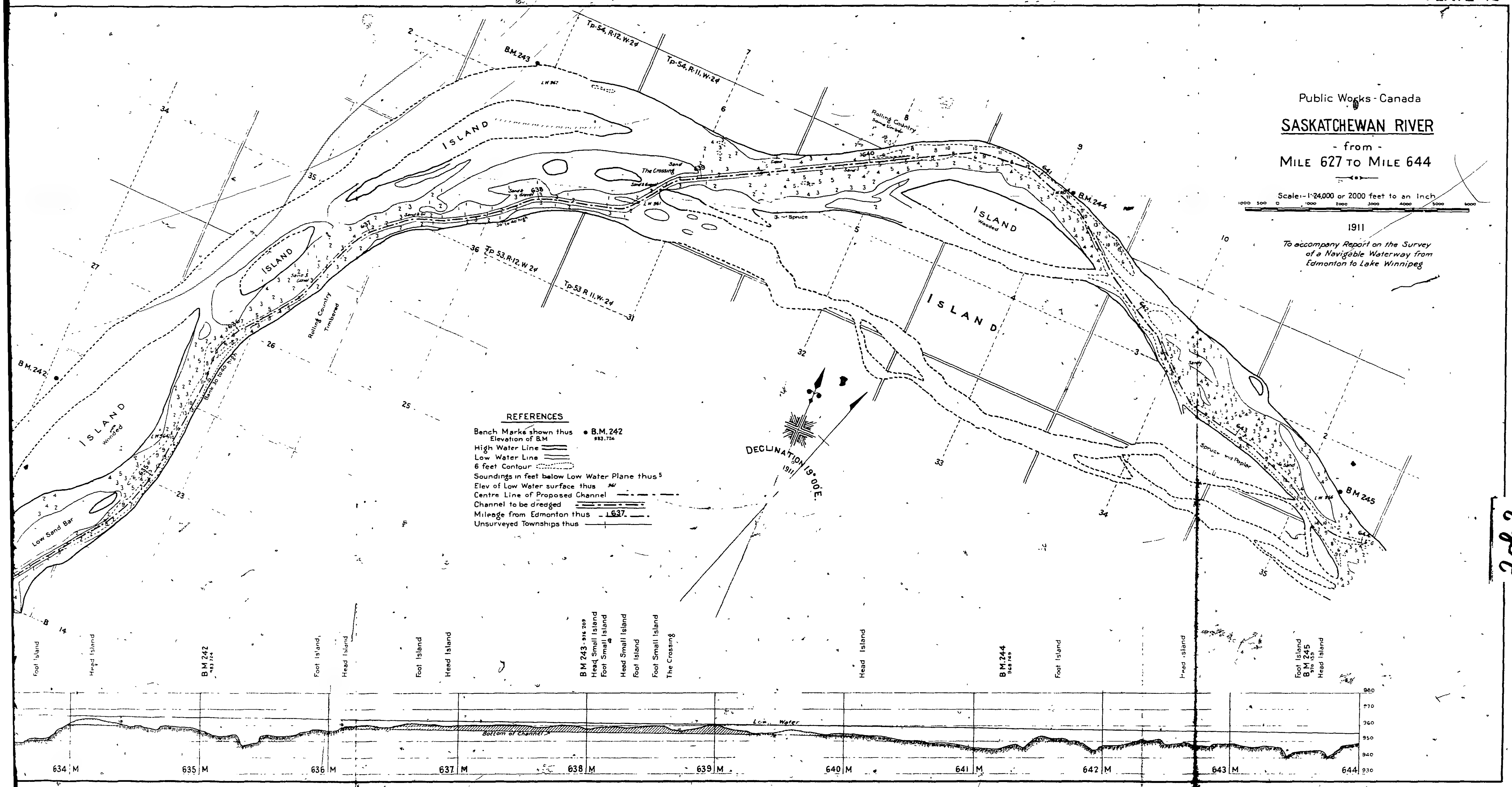

Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 609 TO MILE 627
Scale 1:24,000 or 2000 feet to an inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 22° 0' E.
1911
CRESCENT ISLAND
ROWAN'S ISD
ISLAND
ISLAND
B.M. 233 Approx
B.M. 234
B.M. 235
B.M. 236
B.M. 237
B.M. 238 Approx
Devil's Point
Sand Beach
Spruce Flat
Tp. 52, R. 13, W. 2d
Tp. 52, R. 12, W. 2d
Tp. 53, R. 13, W. 2d
Tp. 52, R. 13, W. 2d
Tp. 53, R. 12, W. 2d
Tp. 52, R. 12, W. 2d
Devil's Point
B.M. 234
B.M. 235
B.M. 236
Head Large Island
Head Small Island
Foot Small Island
Foot Large Island
B.M. 237
Head Crescent Island
Head Rowan Island
Foot Crescent Island
B.M. 238 Approx
Foot Rowan Island
Low Water
Grade
616 M
617 M
618 M
619 M
620 M
621 M
622 M
623 M
624 M
625 M
626 M
627
1010
1000
990
980
970
960
950
940

2 of 2



1b
DECLINATION 22° 15'E. 1911
B.M. 241
B.M. 240
B.M. 239
B.M. 242
B.M. 243
ISLAND
BIRCH ISLAND
Sand Bar
Pemmican Point
Tp. 53, R.12, W.2d
Tp. 52, R.12, W.2d
14th Base Line
Rolling Country
Rolling Country Timbered
ISLAND Wooded
Low Sand Bar
Tp 54, R.12, W.2d
Tp 53, R.12, W.2d
Tp 53 R.11, W.2d
REFERENCES
Bench Marks shown thus • B.M. 242 983 724
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus 961
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 637
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal 40 Feet Vertical
Datum assumed
Head Birch Island
Head Island
B.M. 239 990 464
Foot Birch Island
Pemmican Point
14th Base Line Crosses
B.M. 240 983 634
B.M. 241
Head Island
Foot Island
Head Island
B.M. 242 983 724
Foot Island
Head Island
Foot Island
Head Island
B.M. 243
Head Small Island
Foot Small Island
Head Small Island
Foot Island
Low Water
Grade
Bottom of Channel
627
628 M
629 M
630 M
631 M
632 M
633 M
634 M
635 M
636 M
637 M
638 M

PLATE 42


Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 627 TO MILE 644
Scale:- 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B.M. 242
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 637
Unsurveyed Townships thus
DECLINATION 19° 00' E.
1911
ISLAND
Wooded
Low Sand Bar
B.M. 242
B.M. 243
B.M. 244
B.M. 245
Tp. 54, R. 12, W. 2d
Tp. 54, R. 11, W. 2d
Tp. 53, R. 12, W. 2d
Tp. 53 R. 11, W. 2d
Rolling Country
Timbered
The Crossing
Spruce and Poplar
Foot Island
Head Island
Head Small Island
Foot Small Island
Low Water
Bottom of Channel
634 M
635 M
636 M
637 M
638 M
639 M
640 M
641 M
642 M
643 M
644
980
970
960
950
940
930

282

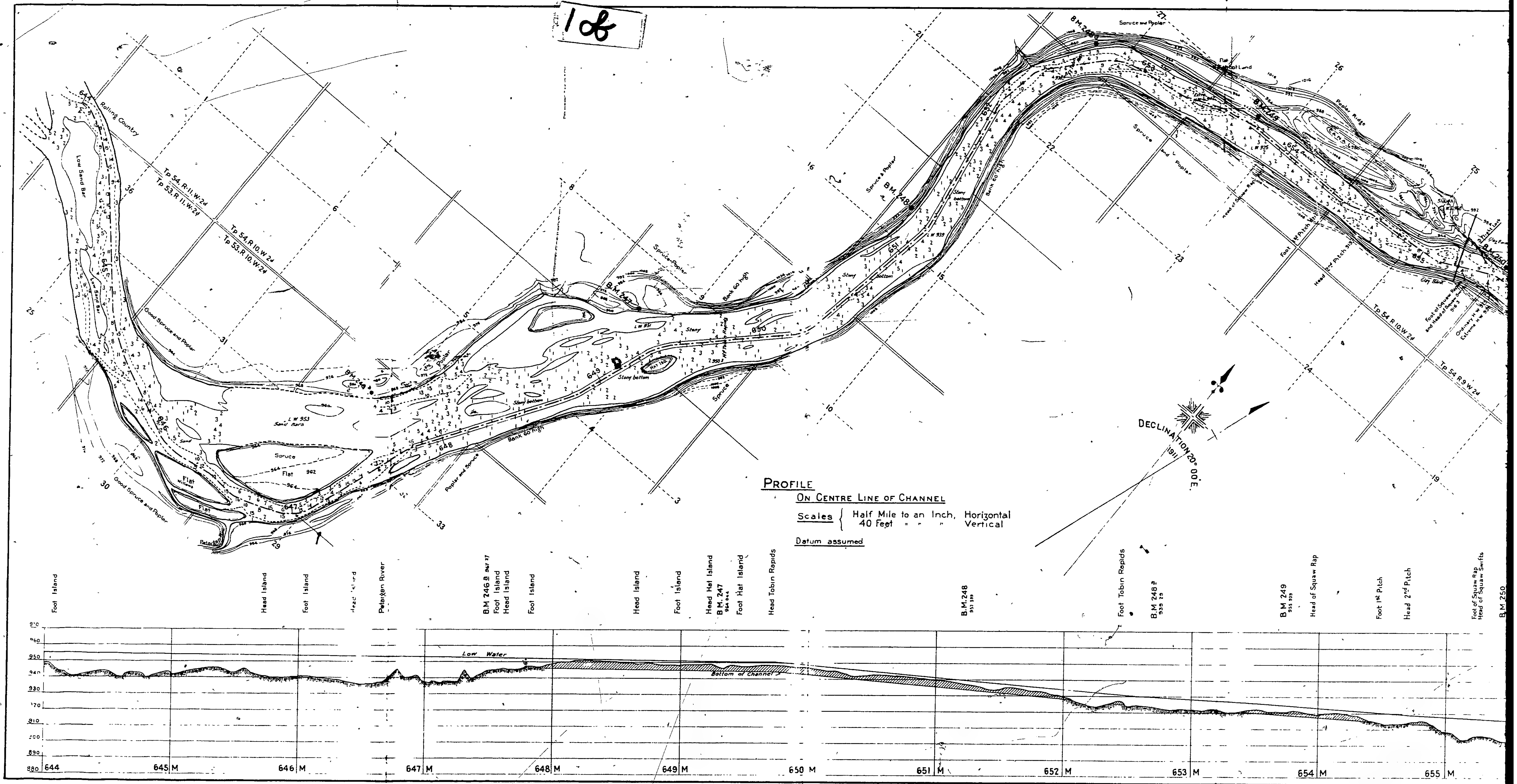
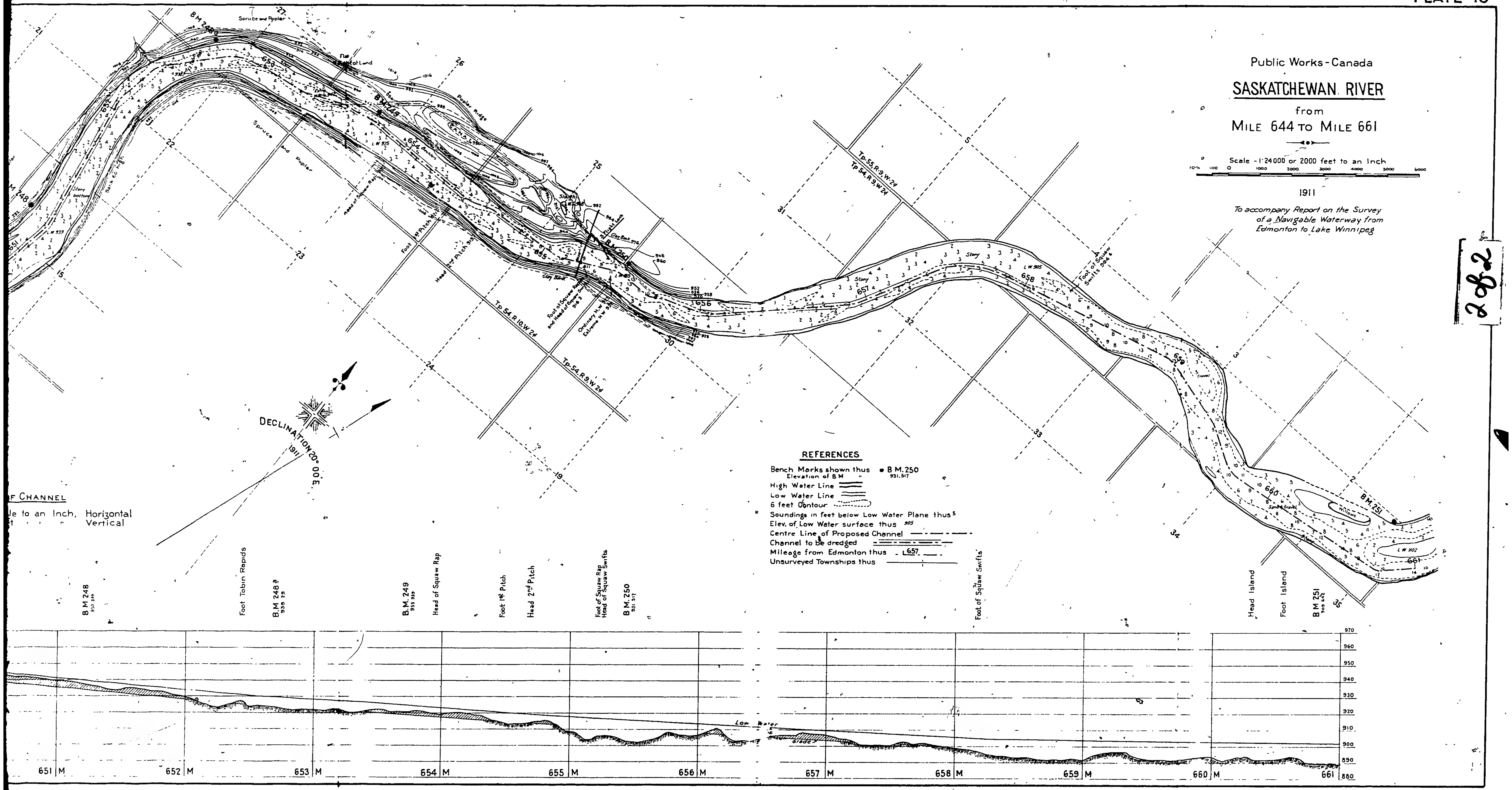
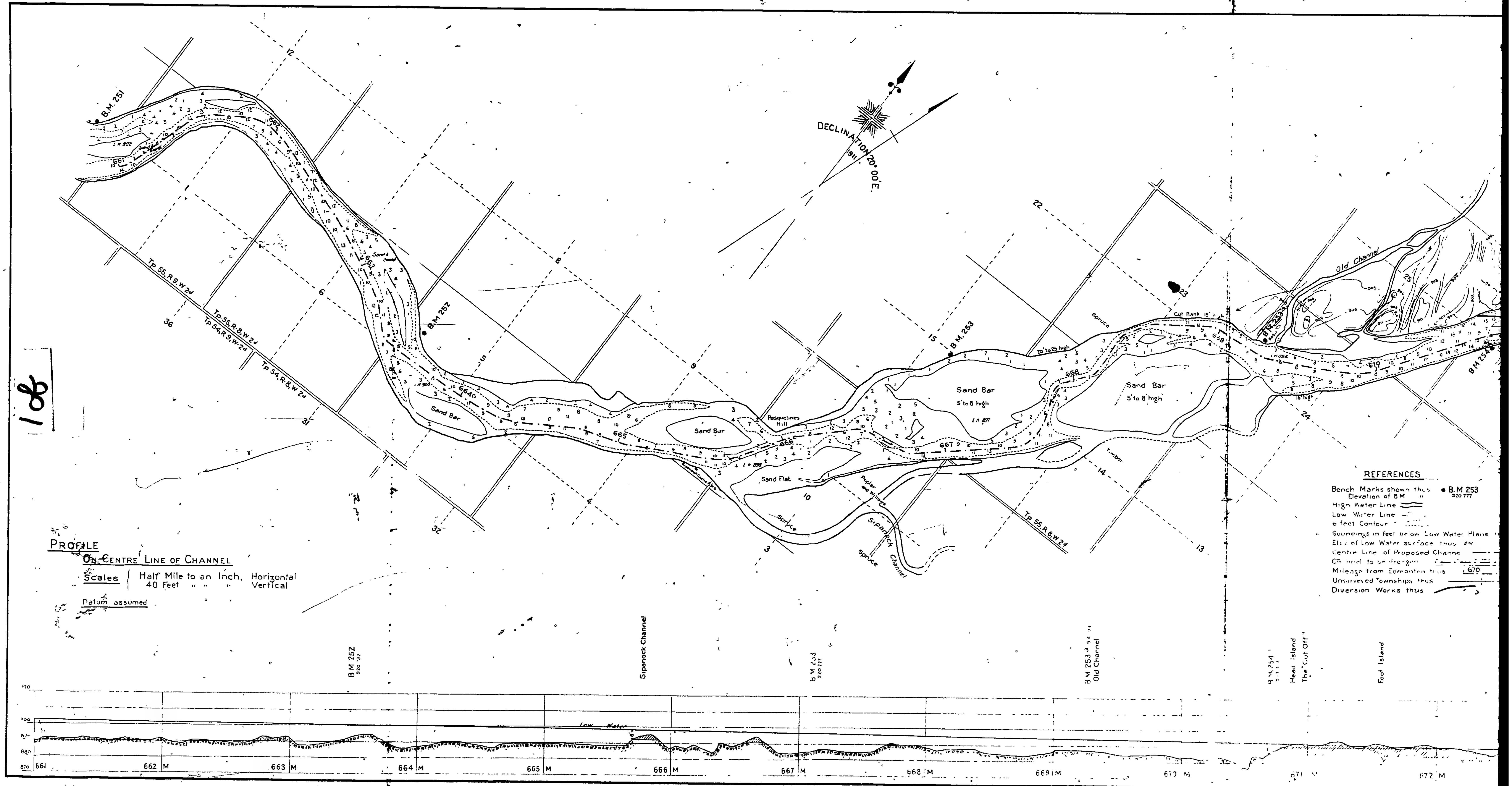

10b
Profile
On Centre Line of Channel
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Declination 20° 00' E. 1911
Rolling Country
Low Sand Bar
Tp 54, R 11, W 2d
Tp 53, R 11, W 2d
Tp 54, R 10, W 2d
Tp 53, R 10, W 2d
Tp 54, R 9, W 2d
Good Spruce and Poplar
Spruce
Flat
Sand Bars
L W 953
Stony bottom
Bank 60 high
Spruce & Poplar
Poplar and Spruce
Spruce and Poplar
Poplar Ridge
B.M. 247
B.M. 248
B.M. 249
B.M. 250
Foot Island
Head Island
Petaigan River
B.M. 246
Head Hat Island
Foot Hat Island
Head Tobin Rapids
Foot Tobin Rapids
Head of Squaw Rap
Foot 1st Pitch
Head 2nd Pitch
Foot of Squaw Rap
Head of Squaw Swifts
Low Water
Bottom of Channel
644
645 M
646 M
647 M
648 M
649 M
650 M
651 M
652 M
653 M
654 M
655 M

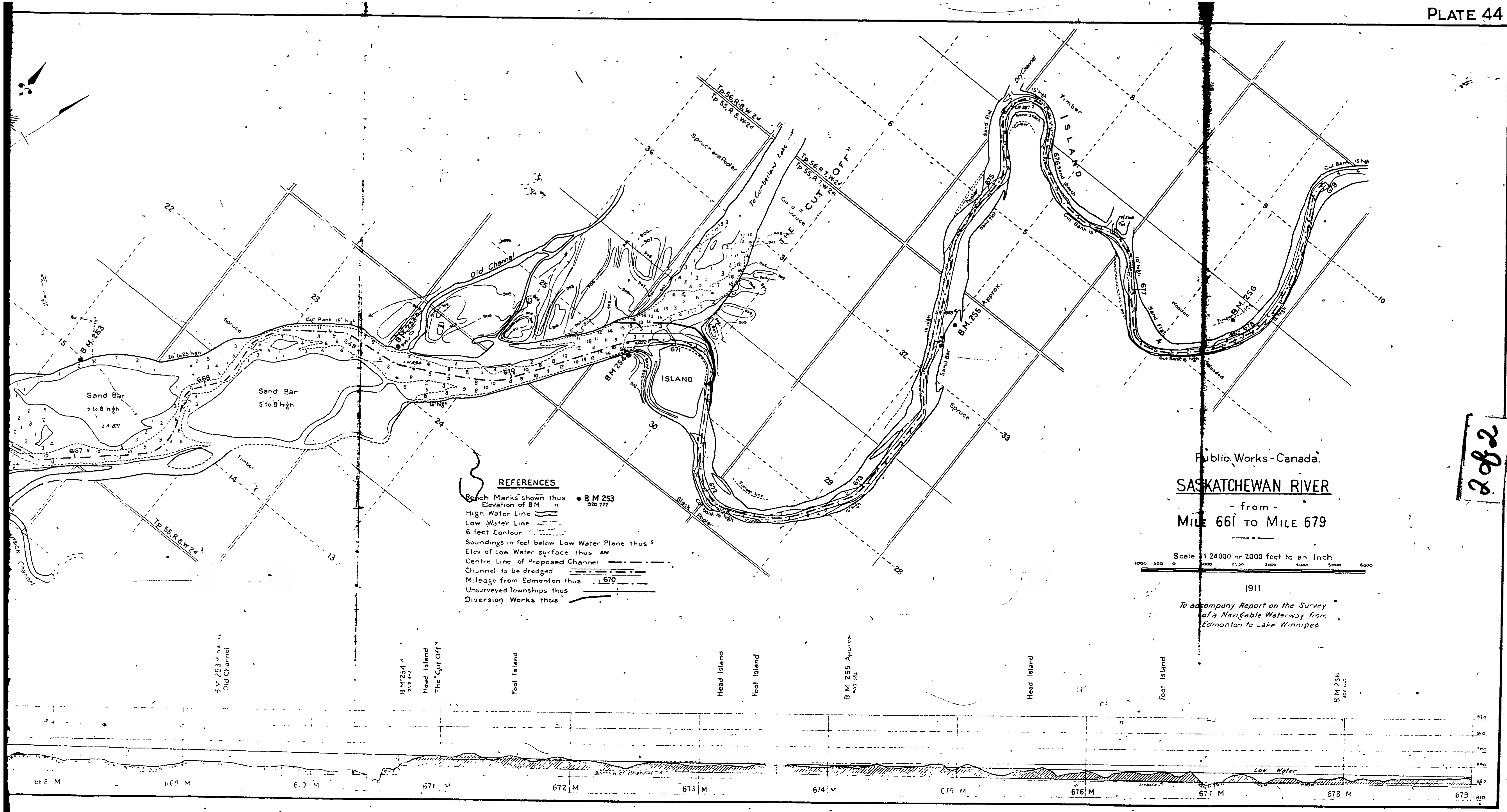
PLATE 43



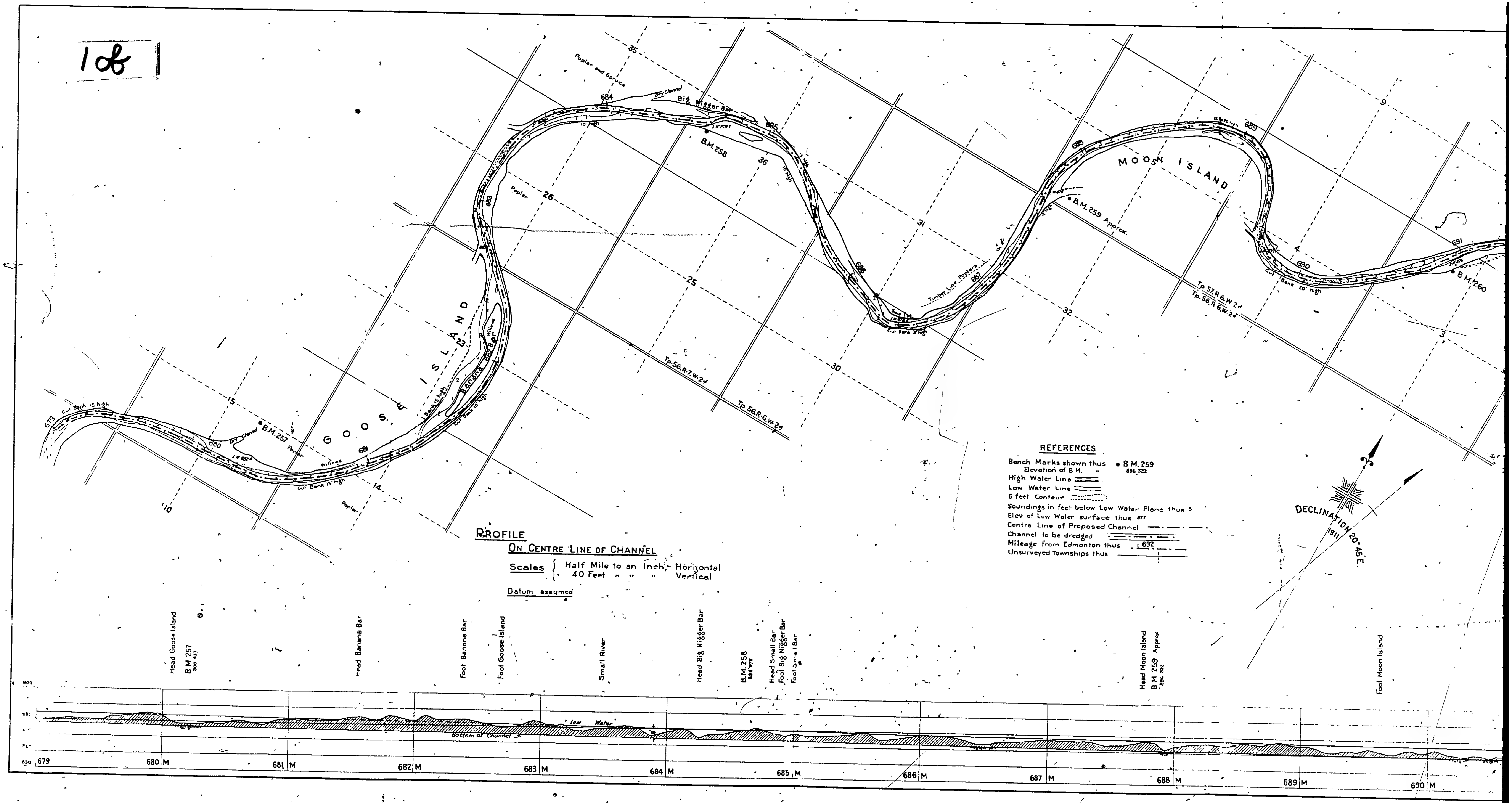
2 of 2

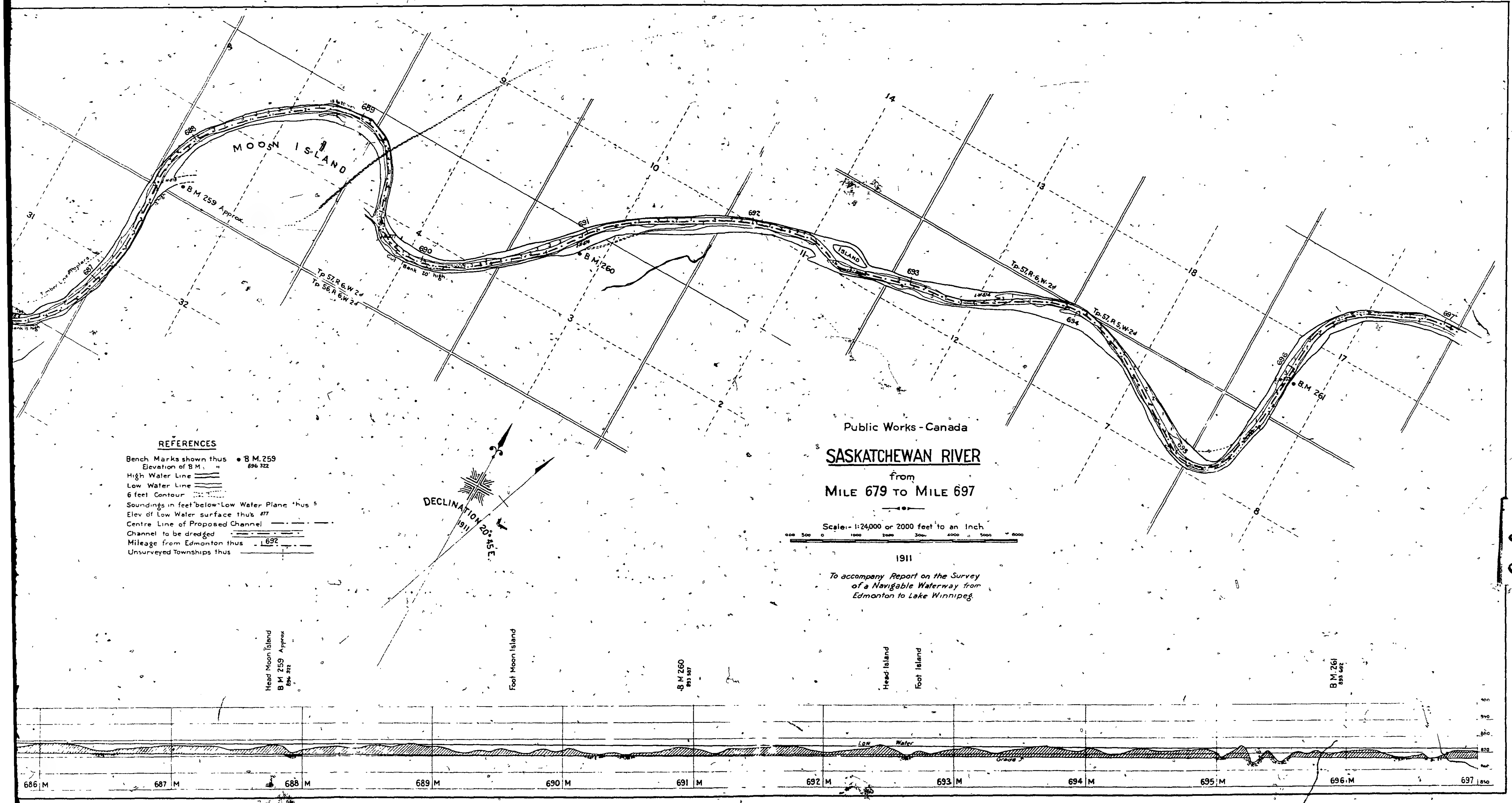


108
B.M. 251
B.M. 252
B.M. 253
B.M. 254
DECLINATION 20° 00' E.
1911
Tp 55, R 9, W 2d
Tp 55, R 8, W 2d
Tp 54, R 9, W 2d
Tp 54, R 8, W 2d
Tp 55, R 8, W 2d
Sand Bar
Sand Bar
Sand Bar
5' to 8' high
Sand Bar
5' to 8' high
Sand Flat
Pasquetines Hill
Poplar and Willows
Spruce
Sipanock Channel
Old Channel
Cut Bank 15' high
20' to 25' high
15' high
Timber
REFERENCES
Bench Marks shown thus • B.M 253
Elevation of B.M. " 920.777
High Water Line
Low Water Line
5 feet Contour
Soundings in feet below Low Water Plane
Elev. of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 670
Unsurveyed Townships thus
Diversion Works thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Sipanock Channel
Old Channel
Head Island
The "Cut Off"
Foot Island
Low Water
661
662 M
663 M
664 M
665 M
666 M
667 M
668 M
669 M
670 M
671 M
672 M


Public Works - Canada.
SASKATCHEWAN RIVER
- from -
MILE 661 TO MILE 679
Scale 1:24000 or 2000 feet to an Inch
1000 500 0 1000 2000 3000 4000 5000 6000
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B M 253
Elevation of B M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 670
Unsurveyed Townships thus
Diversion Works thus
Tp 56, R 8, W 2d
Tp 55, R 8, W 2d
Tp 56, R 7, W 2d
Tp 55, R 7, W 2d
THE "CUT OFF"
To Cumberland Lake
Old Channel
Sand Bar
5 to 8 high
Sand Bar
5' to 8' high
ISLAND
Island
Dry Channel
Timber
Spruce and Poplar
Spruce
Black Poplar
Cut Bank 15' high
Sand Bar
Sand Flat
Wooded
Willow Flat
Timber line
Approx.
B.M. 253
B.M. 254
B.M. 255
B.M. 256
B.M. 254 Head Island The "Cut Off"
B.M. 253 Old Channel
Foot Island
Head Island
Foot Island
B M 255 Approx
Head Island
Foot Island
B M 256
Low Water
Grade
Bottom of Channel
668 M
669 M
670 M
671 M
672 M
673 M
674 M
675 M
676 M
677 M
678 M
679

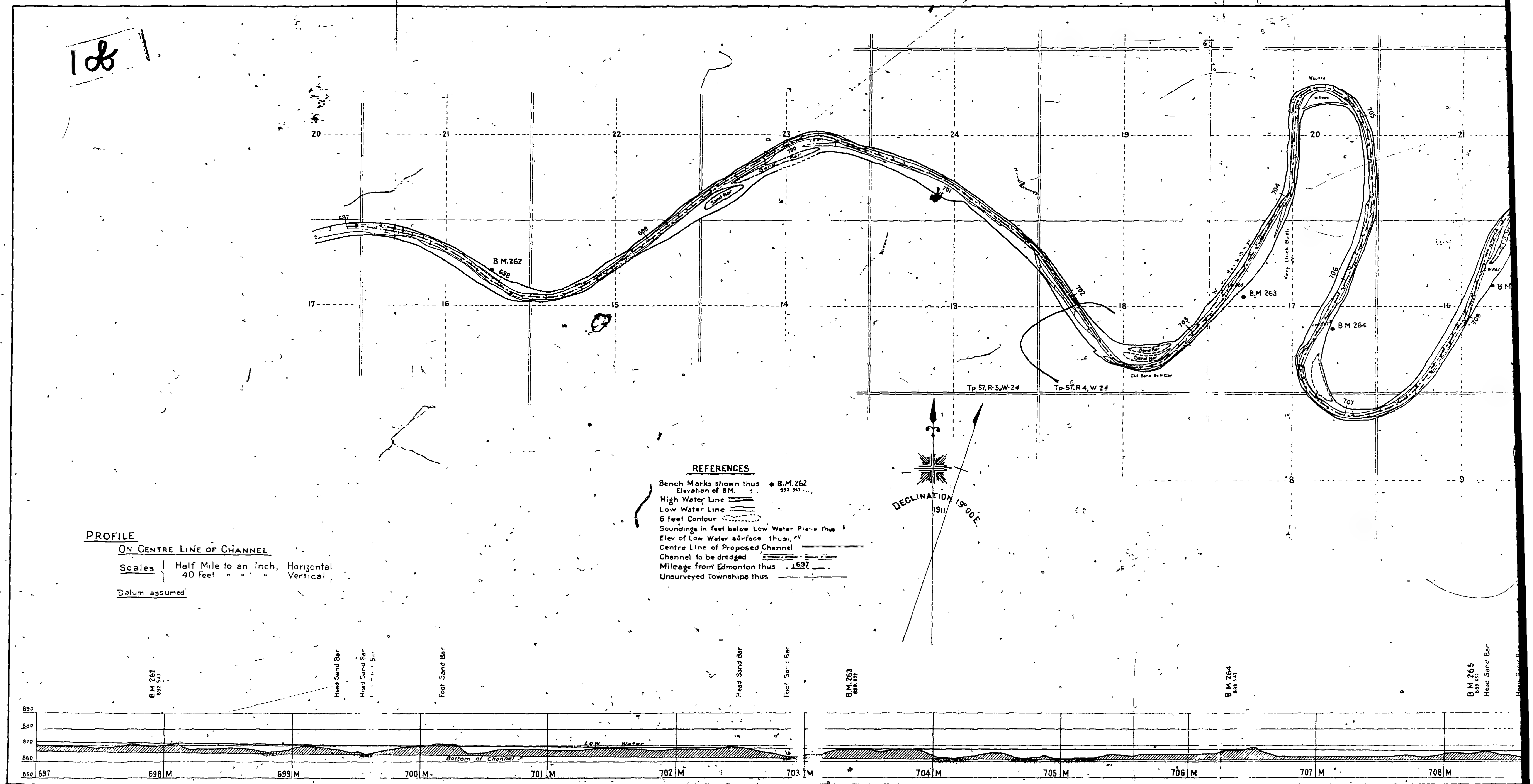
282


1 of
Poplar and Spruce
Dry Channel
Big Nigger Bar
B.M. 258
MOON ISLAND
B.M. 259 Approx.
Timber Line Poplars
Cut Bank 15' high
Tp. 57, R. 6, W. 2d
Tp. 56, R. 6, W. 2d
Cut Bank 20' high
B.M. 260
GOOSE ISLAND
Banana Bar
Willows
Poplar
Cut Bank 15' high
B.M. 257
Tp. 56, R. 7, W. 2d
Tp. 56, R. 6, W. 2d
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B.M. 259
Elevation of B.M. " 896.322
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water surface thus 877
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 692
Unsurveyed Townships thus
DECLINATION 20° 45' E.
1911
Head Goose Island
B.M. 257
Head Banana Bar
Foot Banana Bar
Foot Goose Island
Small River
Head Big Nigger Bar
B.M. 258
Head Small Bar
Foot Big Nigger Bar
Foot Small Bar
Head Moon Island
B.M. 259 Approx.
Foot Moon Island
Low Water
Bottom of Channel
679
680 M
681 M
682 M
683 M
684 M
685 M
686 M
687 M
688 M
689 M
690 M


Public Works - Canada
SASKATCHEWAN RIVER
from
MILE 679 TO MILE 697
Scale - 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B M. 259
Elevation of B M. " 896 322
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 877
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 692
Unsurveyed Townships thus
DECLINATION 20° 45' E. 1911
MOON ISLAND
ISLAND
B M 259 Approx.
B M 260
B M 261
Cut Bank 20' high
Timber Line Poplars
Tp 57, R 6, W 2d
Tp 56, R 6, W 2d
Tp 57, R 5, W 2d
Head Moon Island
B M 259 Approx 896 322
Foot Moon Island
B M 260
Head Island
Foot Island
B M 261
Low Water
Grade
686 M
687 M
688 M
689 M
690 M
691 M
692 M
693 M
694 M
695 M
696 M
697

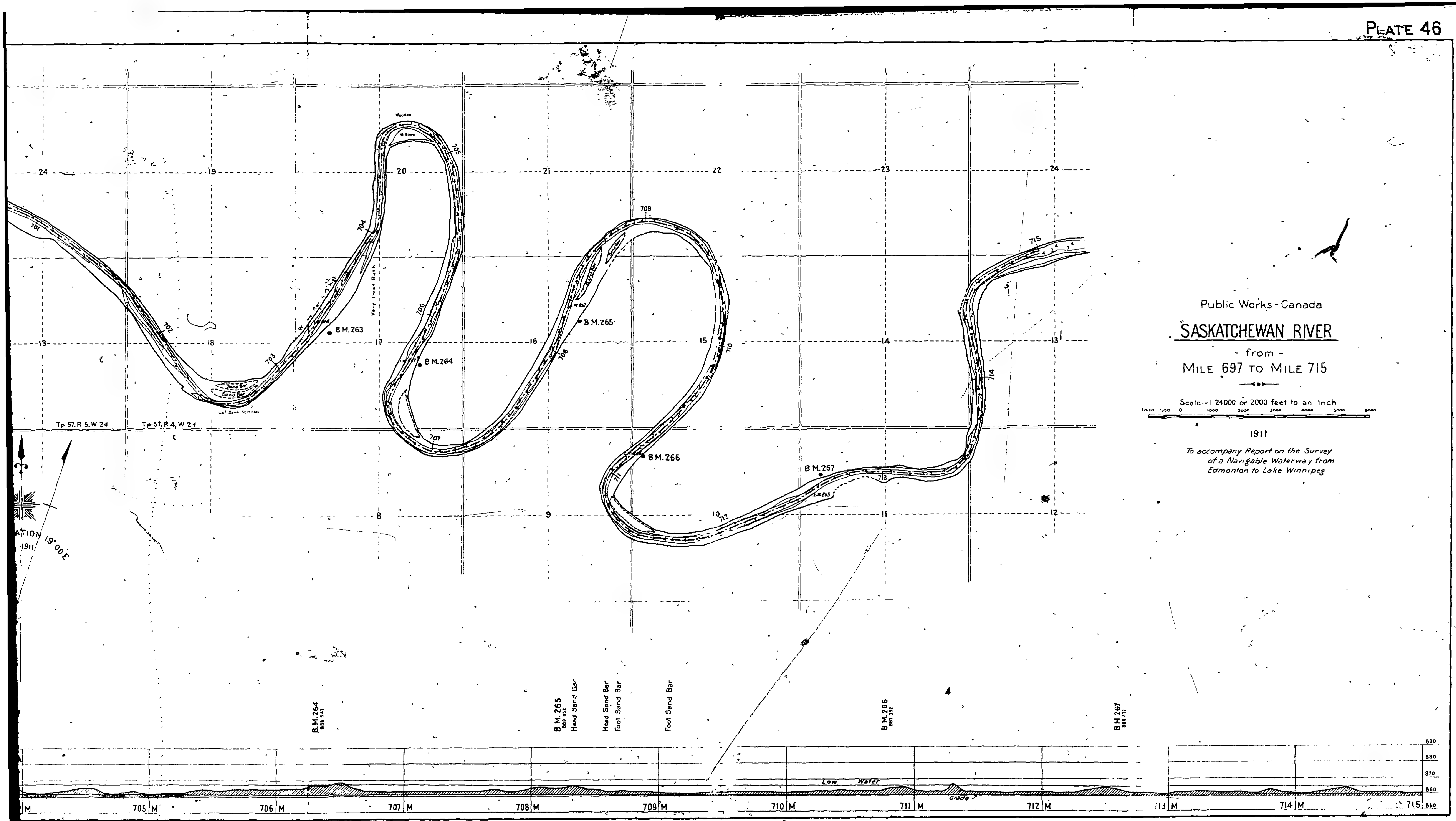
282

108

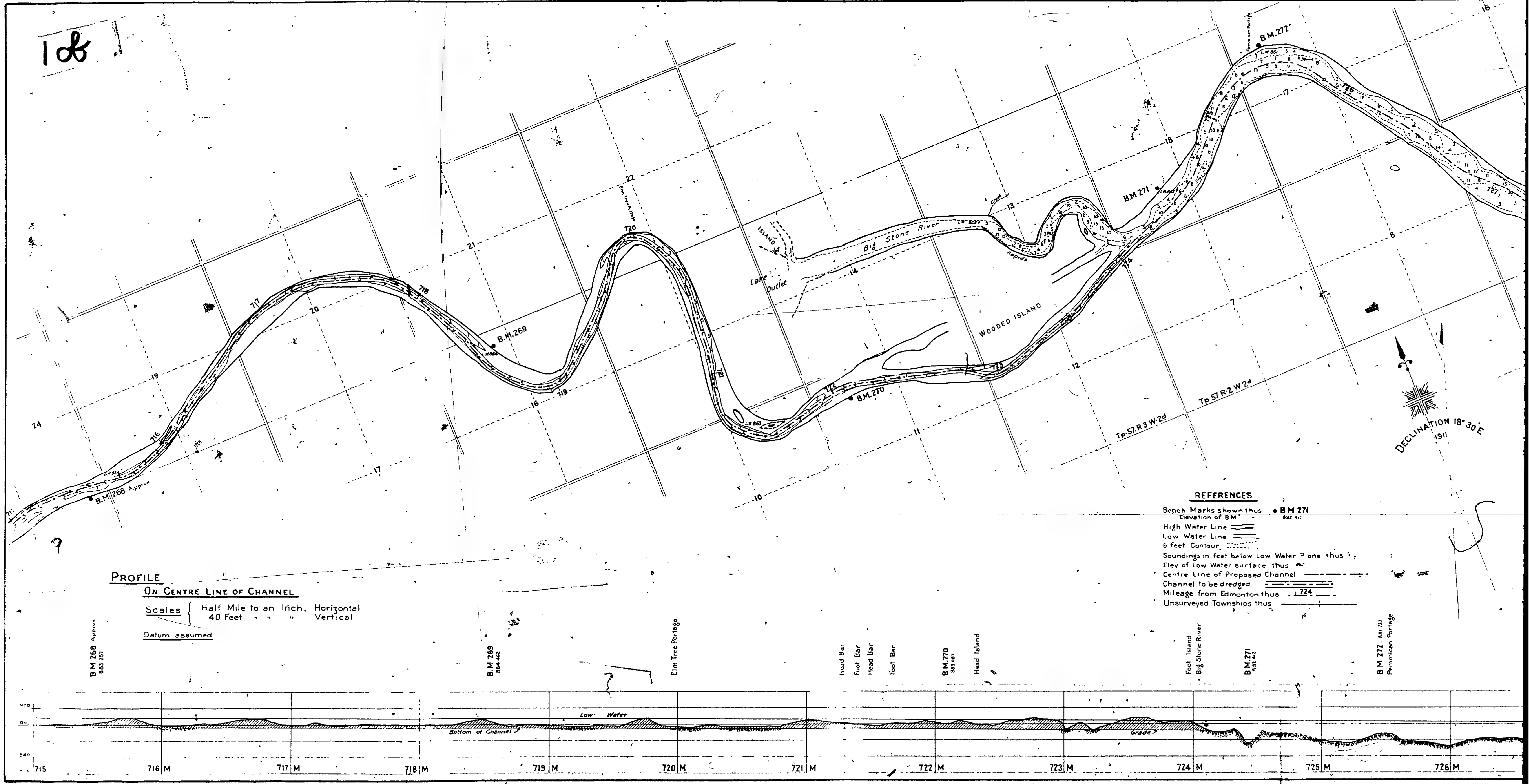


REFERENCES
Bench Marks shown thus • B.M. 262
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 697
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
DECLINATION 19° 00' E.
1911
Tp 57, R 5, W 4
Tp 57, R 4, W 4
B.M. 262
B.M. 263
B.M. 264
Sand Bar
Cut Bank Silt Clay
Very thick Bush
Wooded
Willows
Head Sand Bar
Foot Sand Bar
Low Water
Bottom of Channel
697
698 M
699 M
700 M
701 M
702 M
703 M
704 M
705 M
706 M
707 M
708 M
890
880
870
860
850

PLATE 46

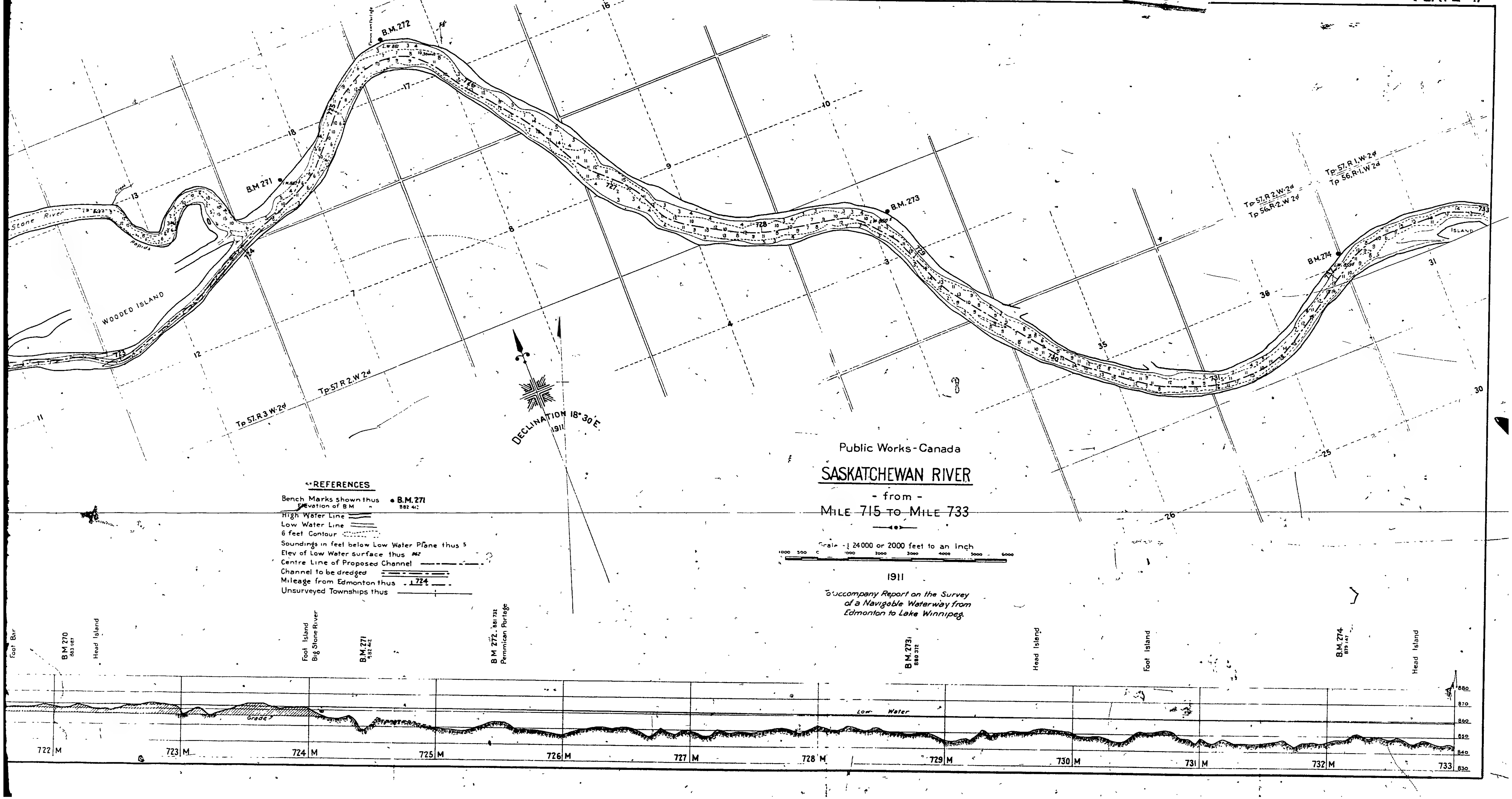


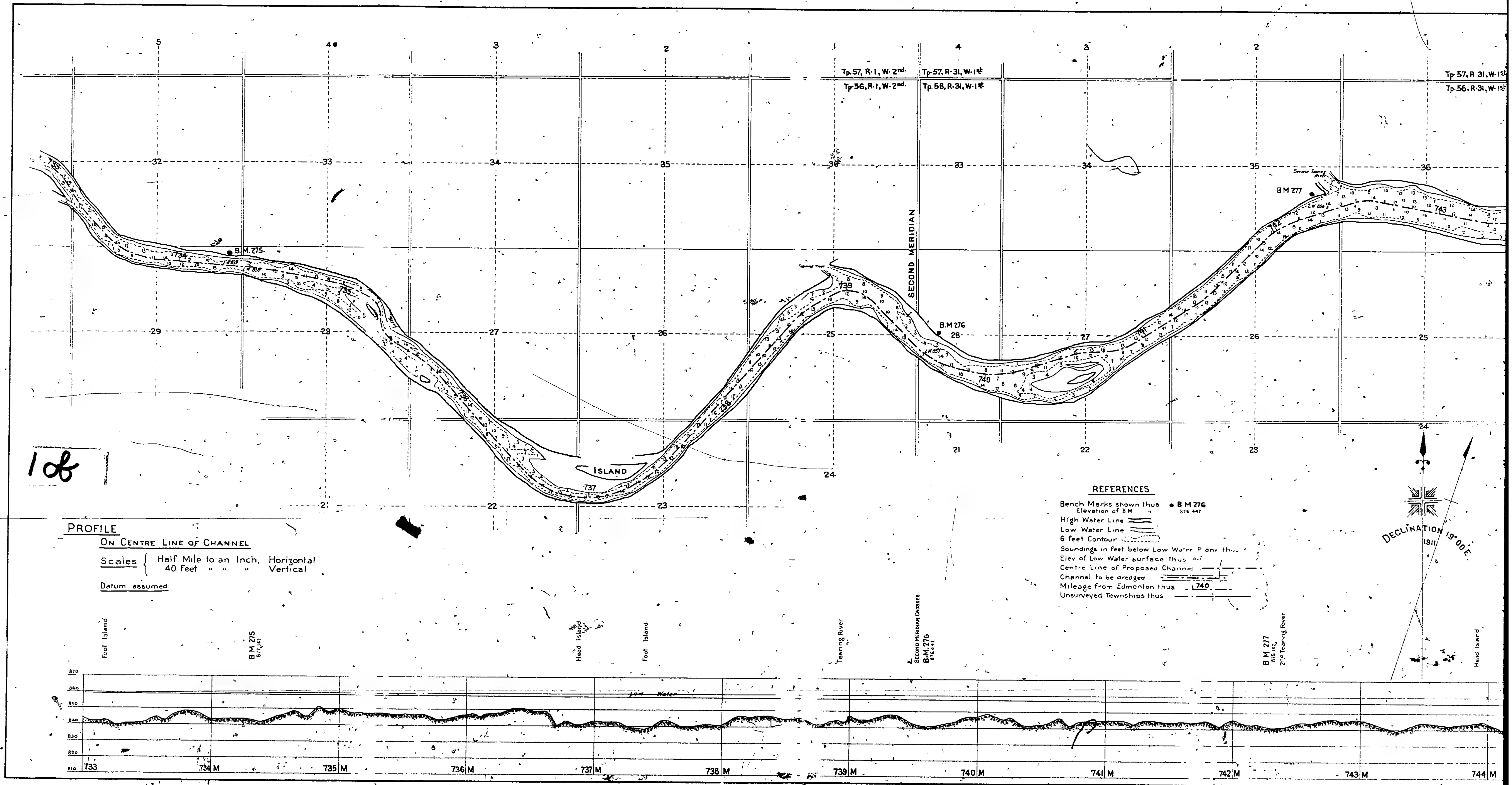
2882



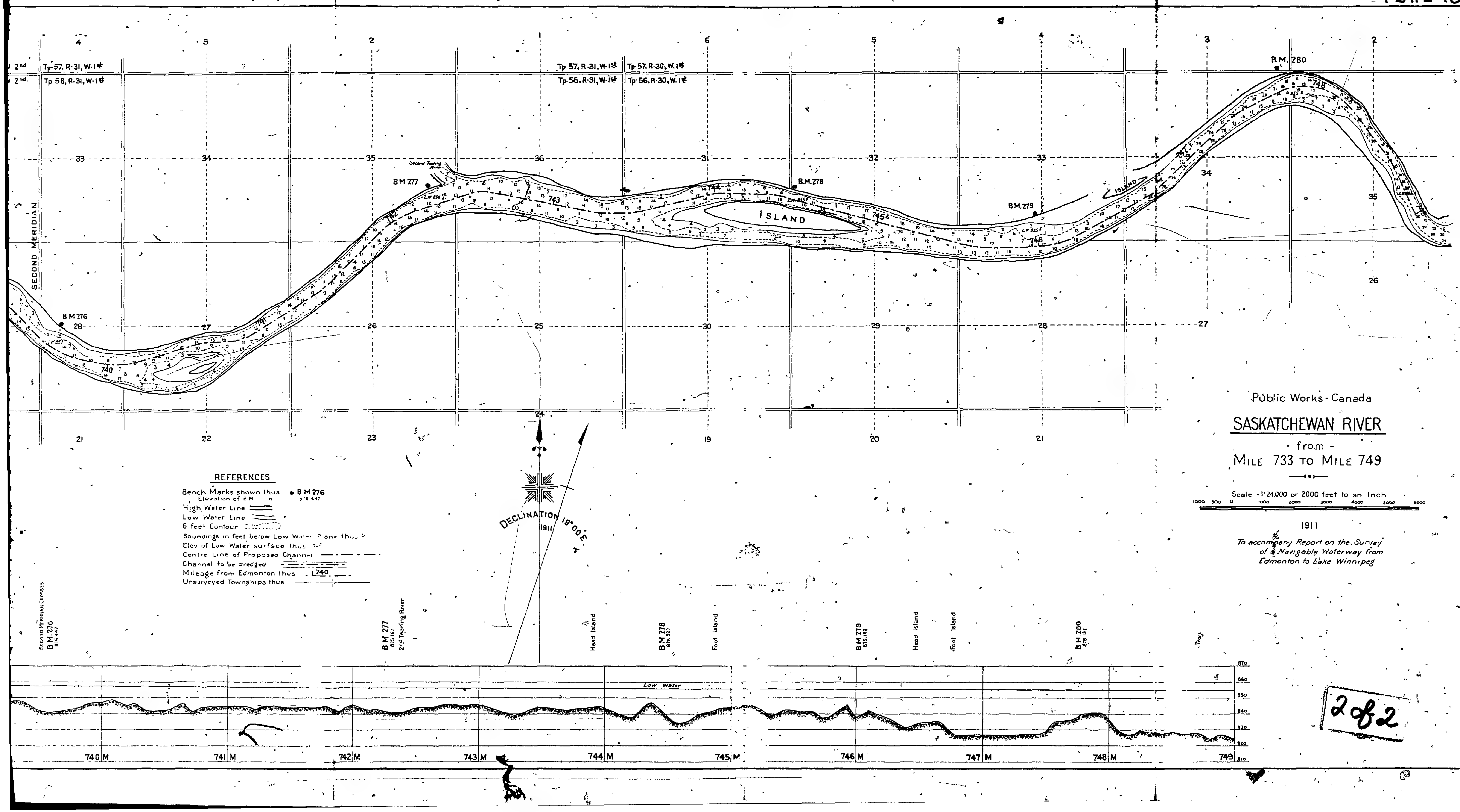
10b
B.M. 268 Approx
B.M. 269
B.M. 270
B.M. 271
B.M. 272
Elm Tree Portage
Pemmican Portage
Big Stone River
Rapids
Creek
ISLAND
Lake Outlet
WOODED ISLAND
Tp 57 R 3 W 2d
Tp 57 R 2 W 2d
DECLINATION 18° 30' E
1911
REFERENCES
Bench Marks shown thus • B M 271
Elevation of B M " " 882 41
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 862
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 724
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B M 268 Approx 865 257
B.M. 269 864 462
Elm Tree Portage
Head Bar
Foot Bar
Head Bar
Foot Bar
B.M. 270 863 487
Head Island
Foot Island
Big Stone River
B.M. 271 882 41
B M 272 881 732
Pemmican Portage
Low Water
Bottom of Channel
Grade
715
716 M
717 M
718 M
719 M
720 M
721 M
722 M
723 M
724 M
725 M
726 M

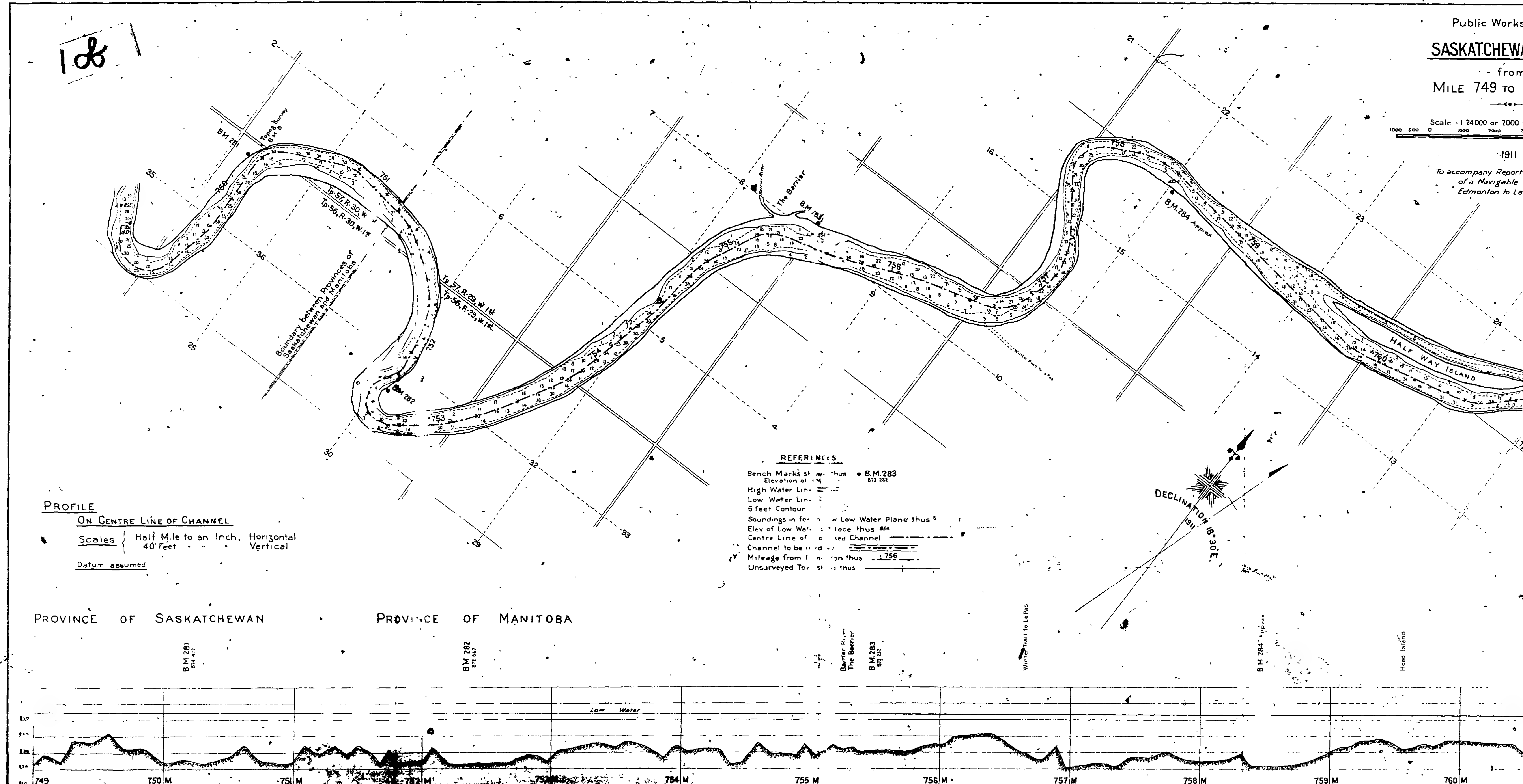
PLATE 47


Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 715 TO MILE 733
Scale 1:24000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B.M. 271
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 724
Unsurveyed Townships thus
DECLINATION 18° 30' E. 1911
WOODED ISLAND
Stone River
Rapids
ISLAND
B.M. 271
B.M. 272
B.M. 273
B.M. 274
Tp. 57. R. 3. W. 2d
Tp. 57. R. 2. W. 2d
Tp. 57. R. 2. W. 2d
Tp. 56. R. 2. W. 2d
Tp. 57. R. 1. W. 2d
Tp. 56. R. 1. W. 2d
Foot Bar
B.M. 270
Head Island
Foot Island
Big Stone River
B.M. 271
B.M. 272
Pemmican Portage
B.M. 273
Head Island
Foot Island
B.M. 274
Head Island
Low Water
Grade
722 M
723 M
724 M
725 M
726 M
727 M
728 M
729 M
730 M
731 M
732 M
733
880
870
860
850
840
830

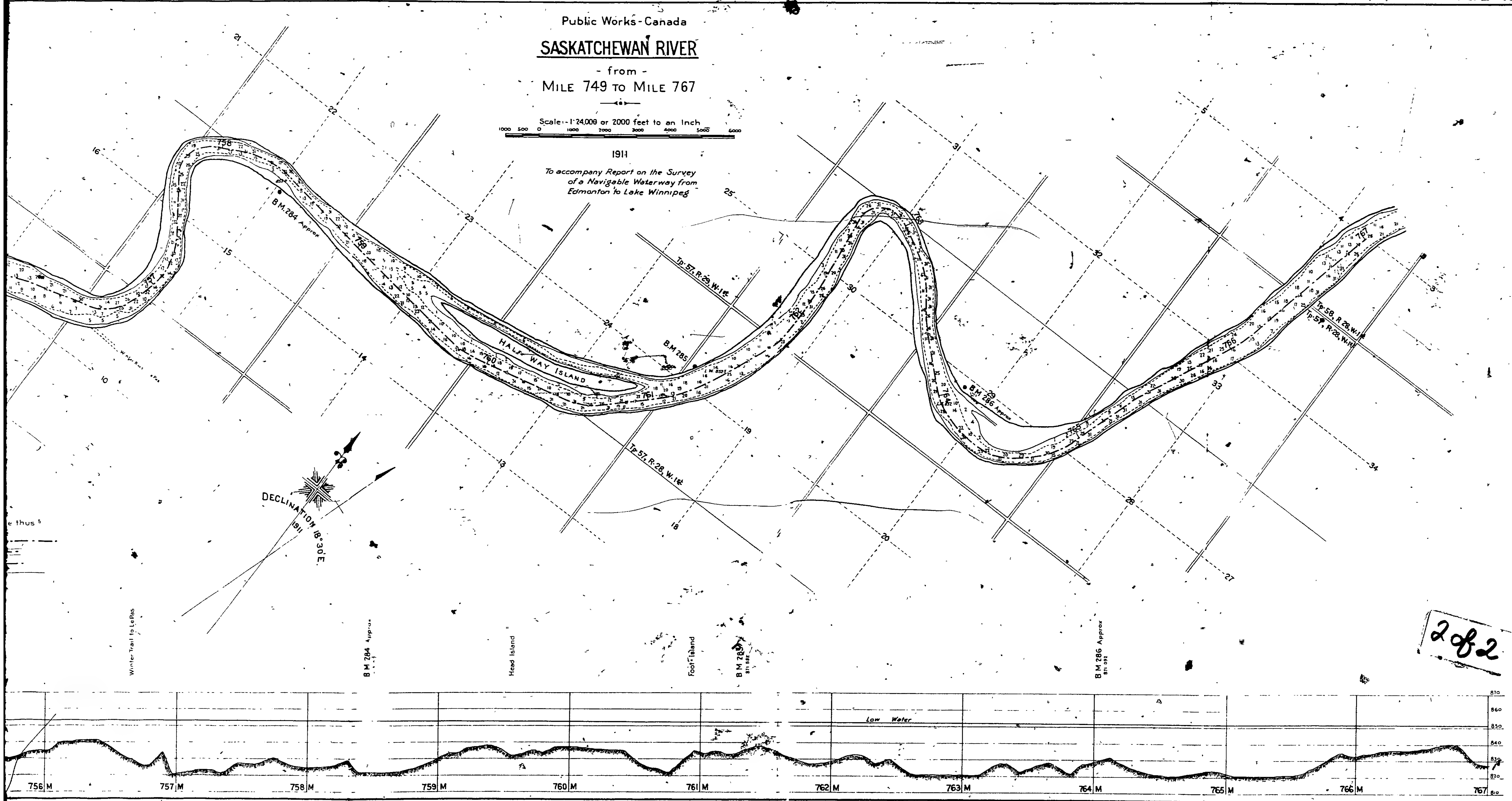


Tp. 57, R. 1, W. 2nd.
Tp. 56, R. 1, W. 2nd.
Tp. 57, R. 31, W. 1st
Tp. 56, R. 31, W. 1st
Tp. 57, R. 31, W. 1st
Tp. 56, R. 31, W. 1st
SECOND MERIDIAN
B.M. 275
B.M 276
B M 277
ISLAND
Tearing River
Second Tearing River
733
734
735
737
739
740
743
1 of
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B M 276
Elevation of B M " 876 447
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 740
Unsurveyed Townships thus
DECLINATION 19°00' E.
1911
Fool Island
B M 275
877.162
Head Island
Fool Island
Tearing River
SECOND MERIDIAN CROSSES
B.M. 276
876.447
B M 277
875.162
2nd Tearing River
Head Island
Low Water
870
860
850
840
830
820
810
733
734 M
735 M
736 M
737 M
738 M
739 M
740 M
741 M
742 M
743 M
744 M


Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 733 TO MILE 749
Scale - 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus • B M 276
Elevation of B M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 740
Unsurveyed Townships thus
DECLINATION 19°00' E. 1911
Tp 57, R-31, W-1st
Tp 56, R-31, W-1st
Tp 57, R-30, W-1st
Tp-56, R-30, W-1st
SECOND MERIDIAN
ISLAND
Second Tearing River
B M 276
B M 277
B.M. 278
B.M. 279
B.M. 280
Second Meridian Crosses
2nd Tearing River
Head Island
Foot Island
Low Water
740 M
741 M
742 M
743 M
744 M
745 M
746 M
747 M
748 M
749
2 of 2



Public Works
SASKATCHEWA
from
MILE 749 TO M
Scale - 1 24000 or 2000 fe
1000 500 0 1000 2000
1911
To accompany Report o
of a Navigable W
Edmonton to Lake
108
B.M. 281
B.M. 282
B.M. 283
B.M. 284 Approx.
Tp. 57, R. 30, W. 1st
Tp. 56, R. 30, W. 1st
Tp. 57, R. 29, W. 1st
Tp. 56, R. 29, W. 1st
Boundary between Provinces of Saskatchewan and Manitoba
The Barrier
HALF WAY ISLAND
DECLINATION 18°30'E. 1911
REFERENCES
Bench Marks shown thus • B.M.283
Elevation of B.M. 873 232
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 6
Elev of Low Water Surface thus 854
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 756
Unsurveyed Township thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
PROVINCE OF SASKATCHEWAN
PROVINCE OF MANITOBA
Barrier River
The Barrier
Winter Trail to Le Pas
Head Island
Low Water
749
750 M
751 M
752 M
753 M
754 M
755 M
756 M
757 M
758 M
759 M
760 M



Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 749 TO MILE 767
Scale:- 1:24,000 or 2000 feet to an Inch
1911
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
HALF WAY ISLAND
B.M. 284 Approx
B.M. 285
B.M. 286 Approx
Tp. 57, R. 28, W. 1st
Tp. 58, R. 28, W. 1st
Tp. 57, R. 28, W. 1st
DECLINATION 18° 30' E.
1911
Winter Trail to Le Pas
B.M. 284 Approx
Head Island
Foot Island
B.M. 285
B.M. 286 Approx
Low Water
756 M
757 M
758 M
759 M
760 M
761 M
762 M
763 M
764 M
765 M
766 M
767
2 of 2

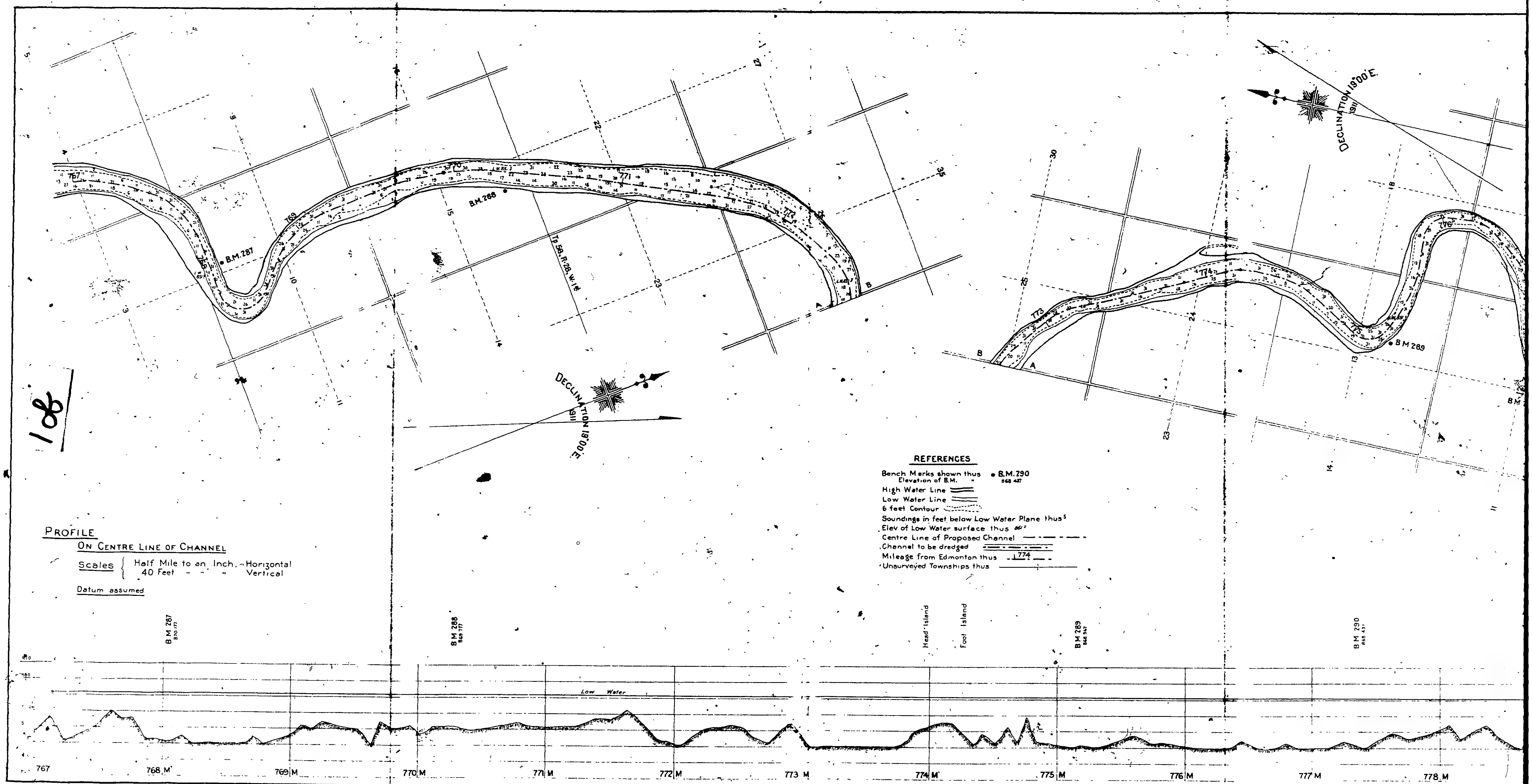
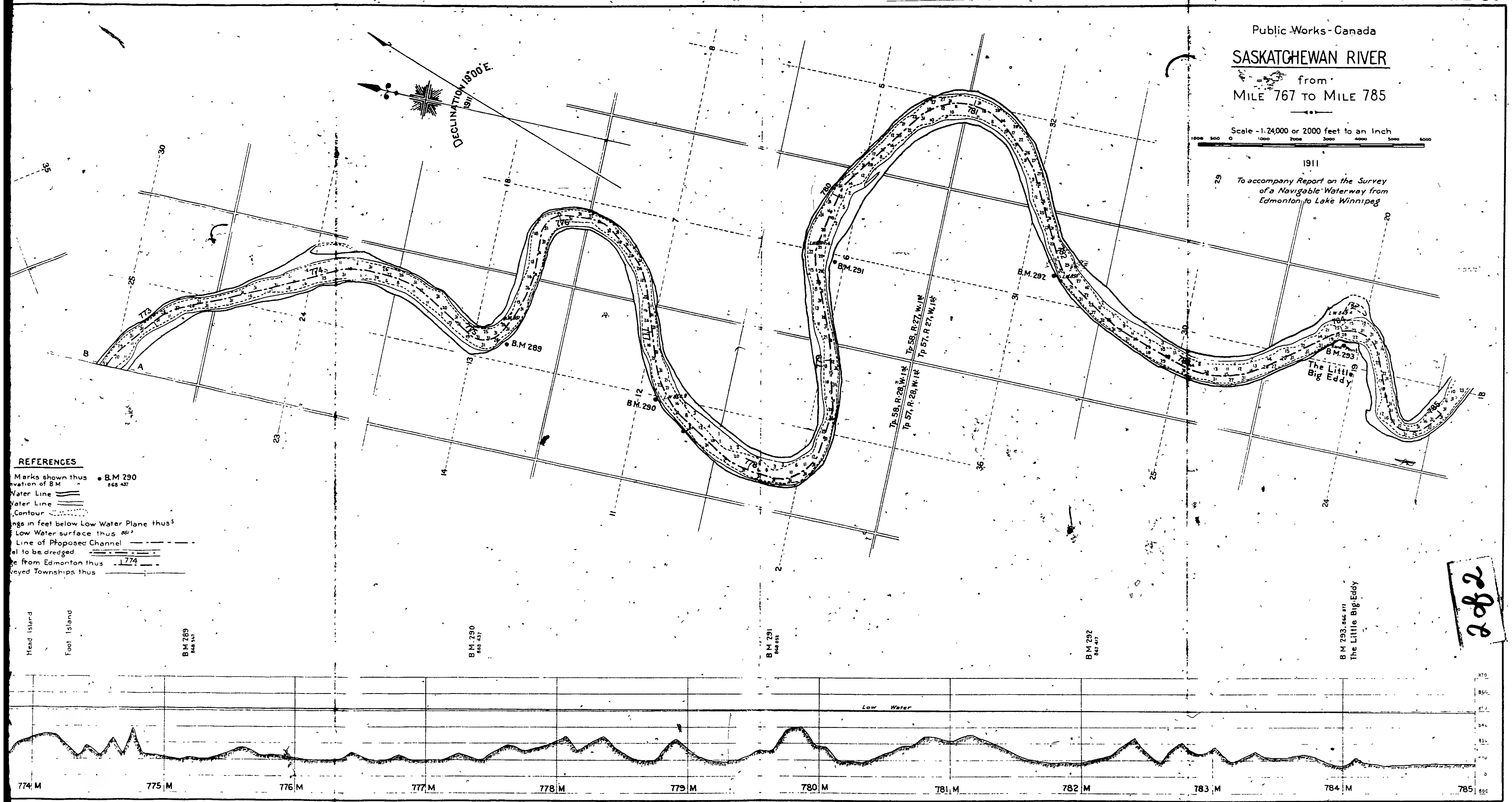
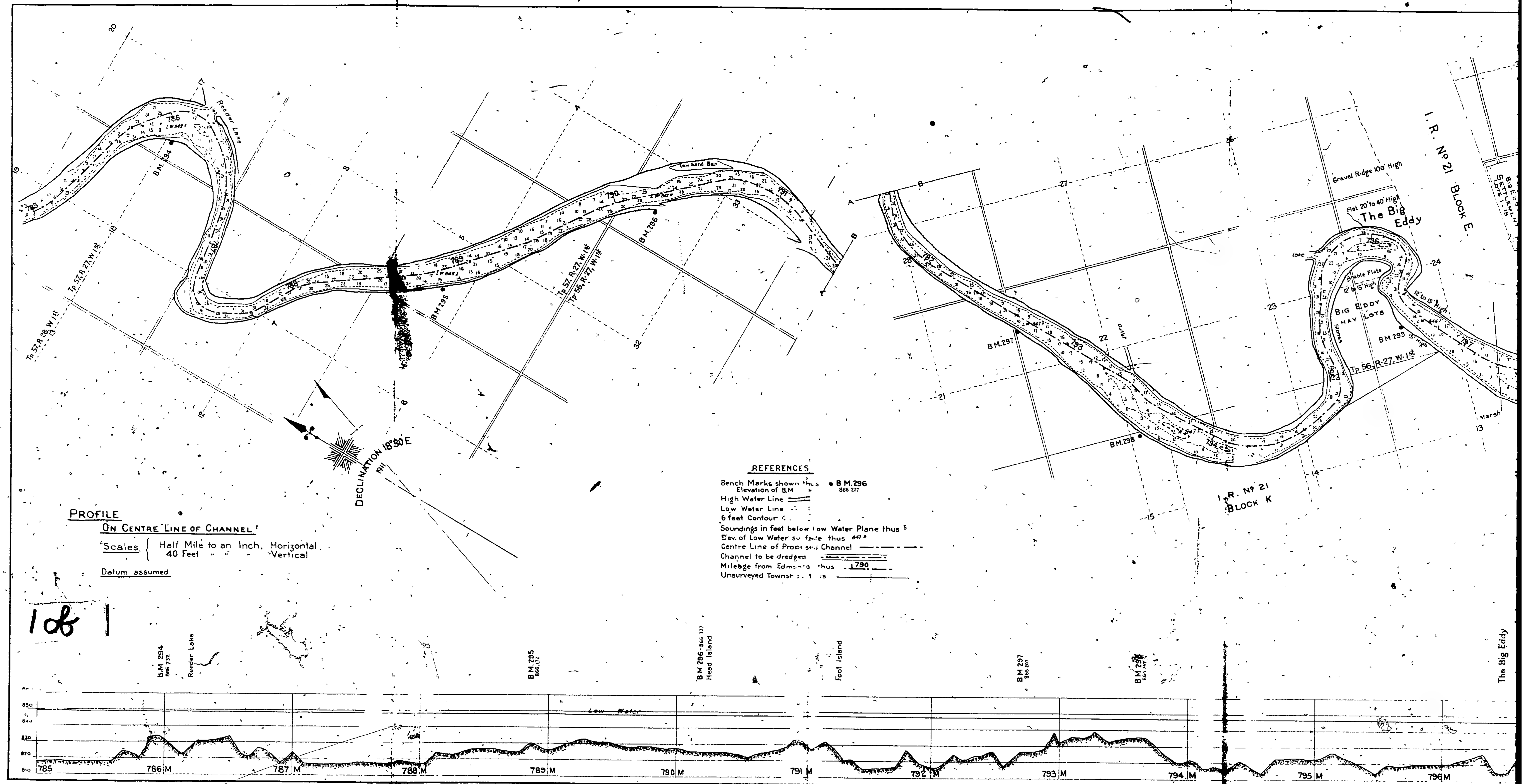

108
DECLINATION 19°00'E.
1911
Tp. 58, R. 28, W. 4th
B.M. 287
B.M. 288
B M 289
767
768
769
770
771
772
773
774
775
776
REFERENCES
Bench Marks shown thus • B.M. 290
Elevation of B.M. " 868 437
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 774
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch — Horizontal
40 Feet " " " Vertical
Datum assumed
B M 287
B M 288
Head Island
Foot Island
B M 289
B M 290
Low Water
767
768 M
769 M
770 M
771 M
772 M
773 M
774 M
775 M
776 M
777 M
778 M

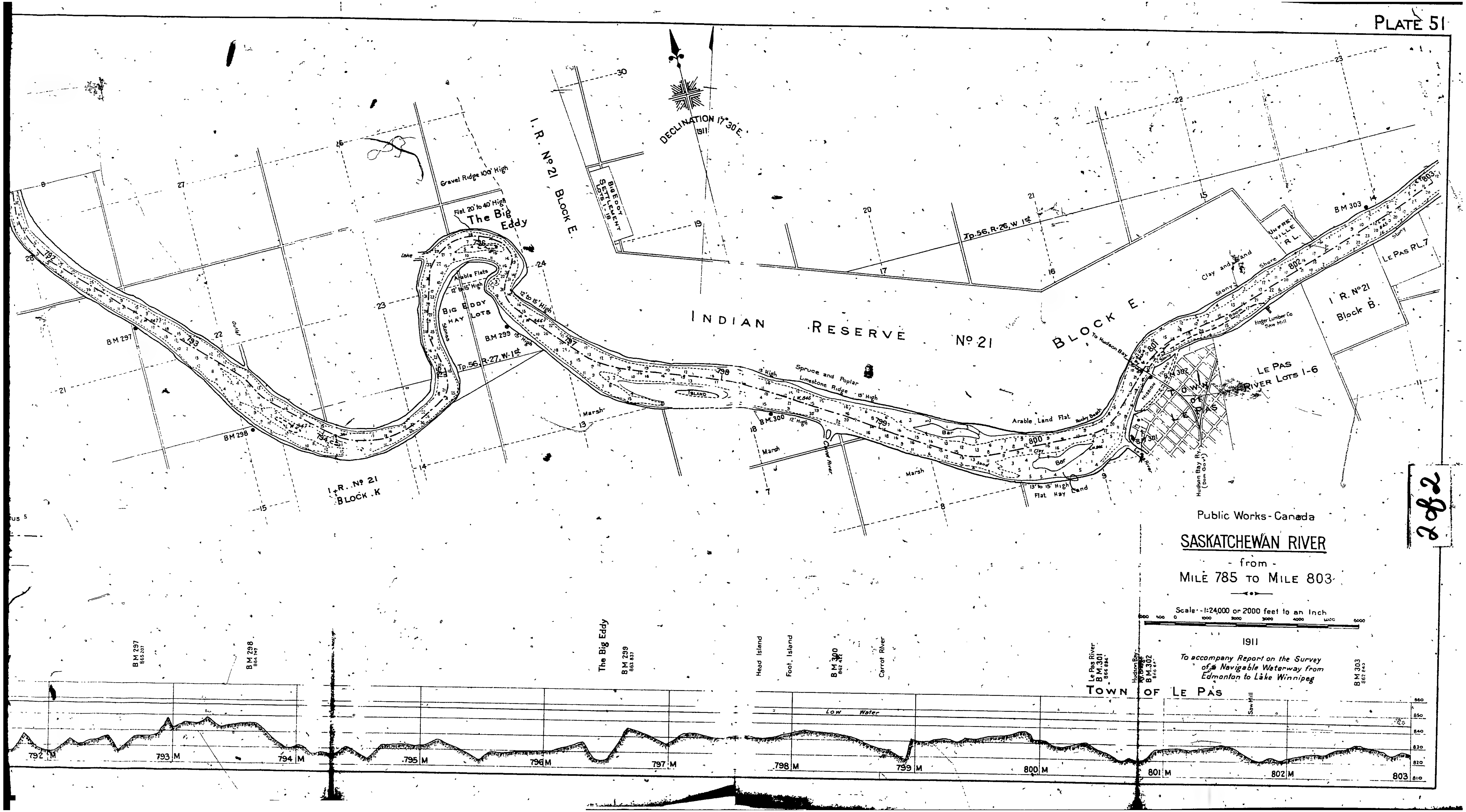
PLATE 50



2 of 2



Reeder Lake
Low Sand Bar
B.M. 294
B.M. 295
B.M. 296
B.M. 297
B.M. 298
B.M. 299
Tp. 57, R. 28, W. 1st
Tp. 57, R. 27, W. 1st
Tp. 56, R. 27, W. 1st
DECLINATION 18°30' E
1911
I.R. Nº 21
BLOCK E
I.R. Nº 21
BLOCK K
Gravel Ridge 100' High
Flat 20' to 40' High
The Big Eddy
Arable Flats
12' to 15' High
BIG EDDY
HAY LOTS
Marsh
Lake
REFERENCES
Bench Marks shown thus • B.M. 296
Elevation of B.M. 866.227
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev. of Low Water surface thus 847.9
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 790
Unsurveyed Township lines
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
1 of 1
Reeder Lake
Head Island
Foot Island
The Big Eddy
Low Water
785
786 M
787 M
788 M
789 M
790 M
791 M
792 M
793 M
794 M
795 M
796 M



Public Works - Canada

SASKATCHEWAN RIVER

- from -

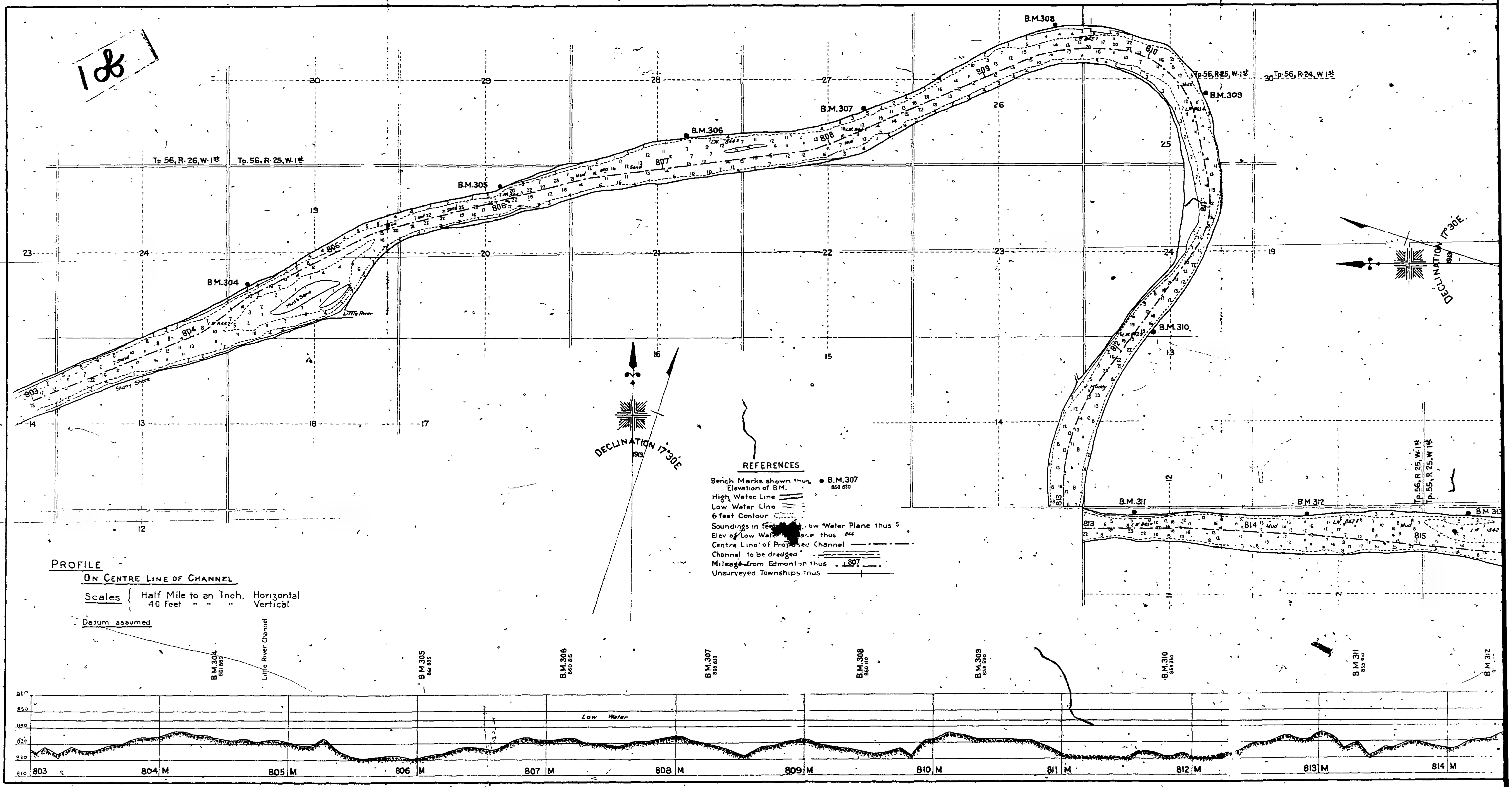
Mile 785 to Mile 803

Scale - 1:24000 or 2000 feet to an Inch

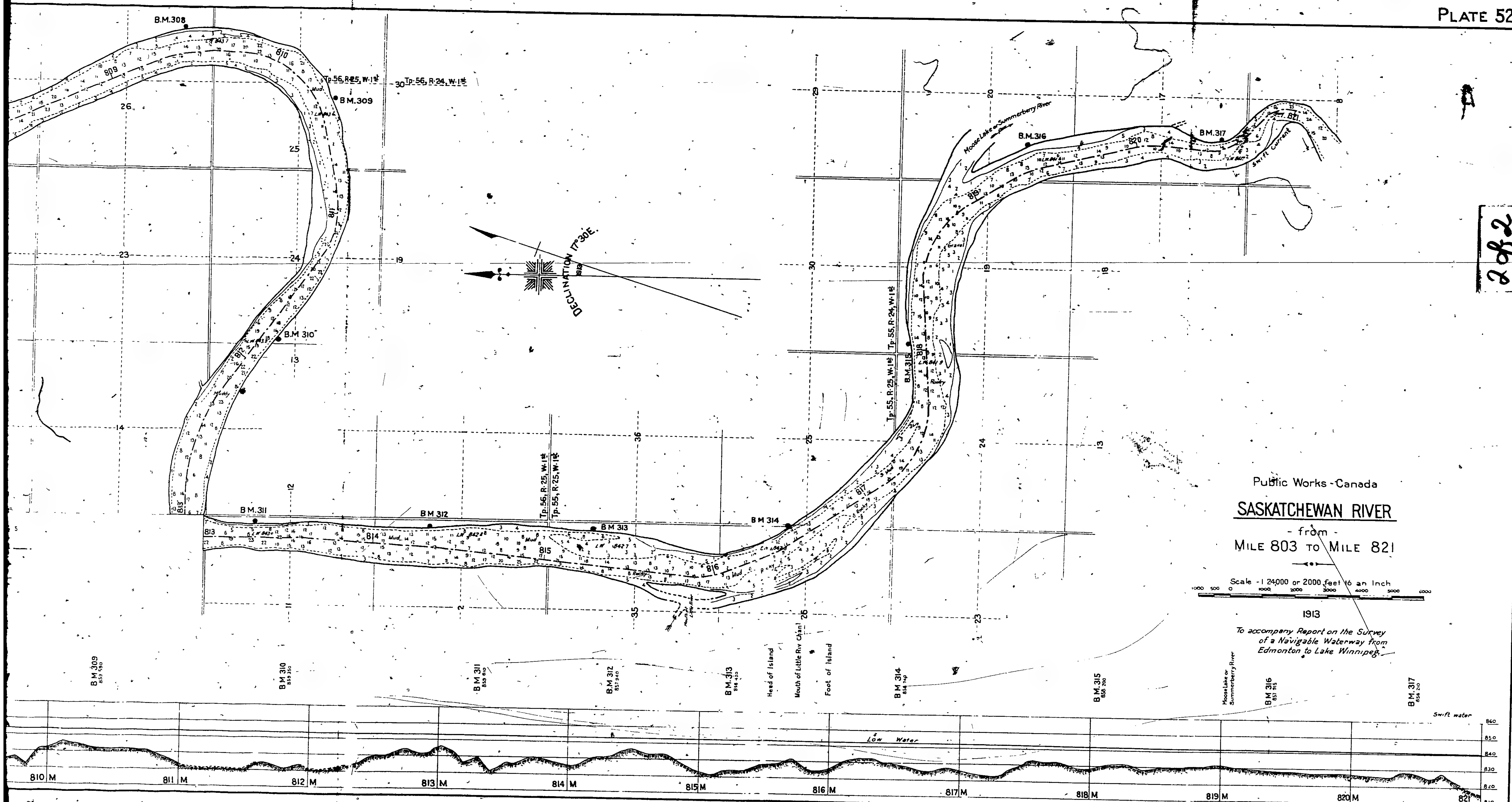
1911

To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg

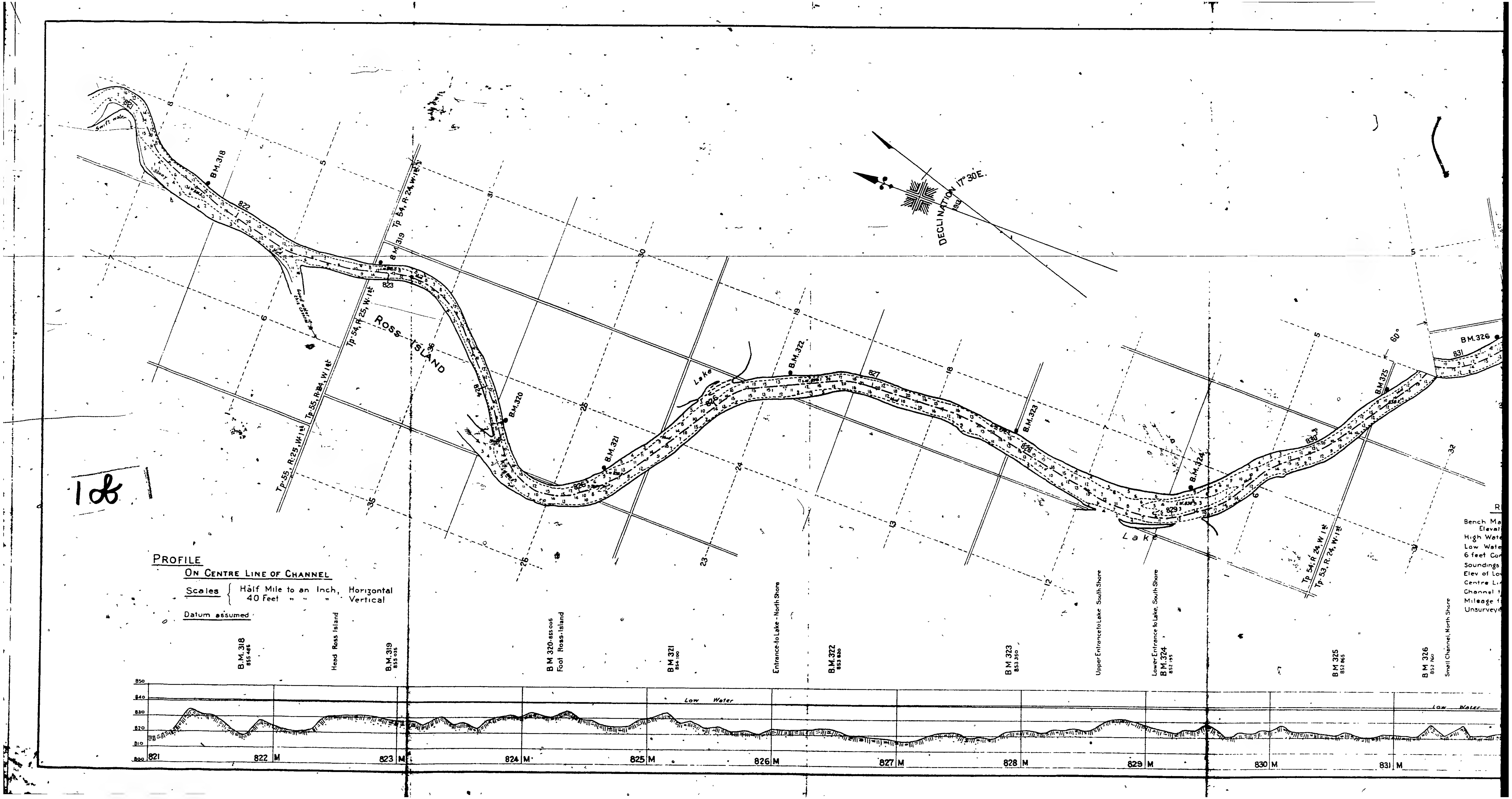
282



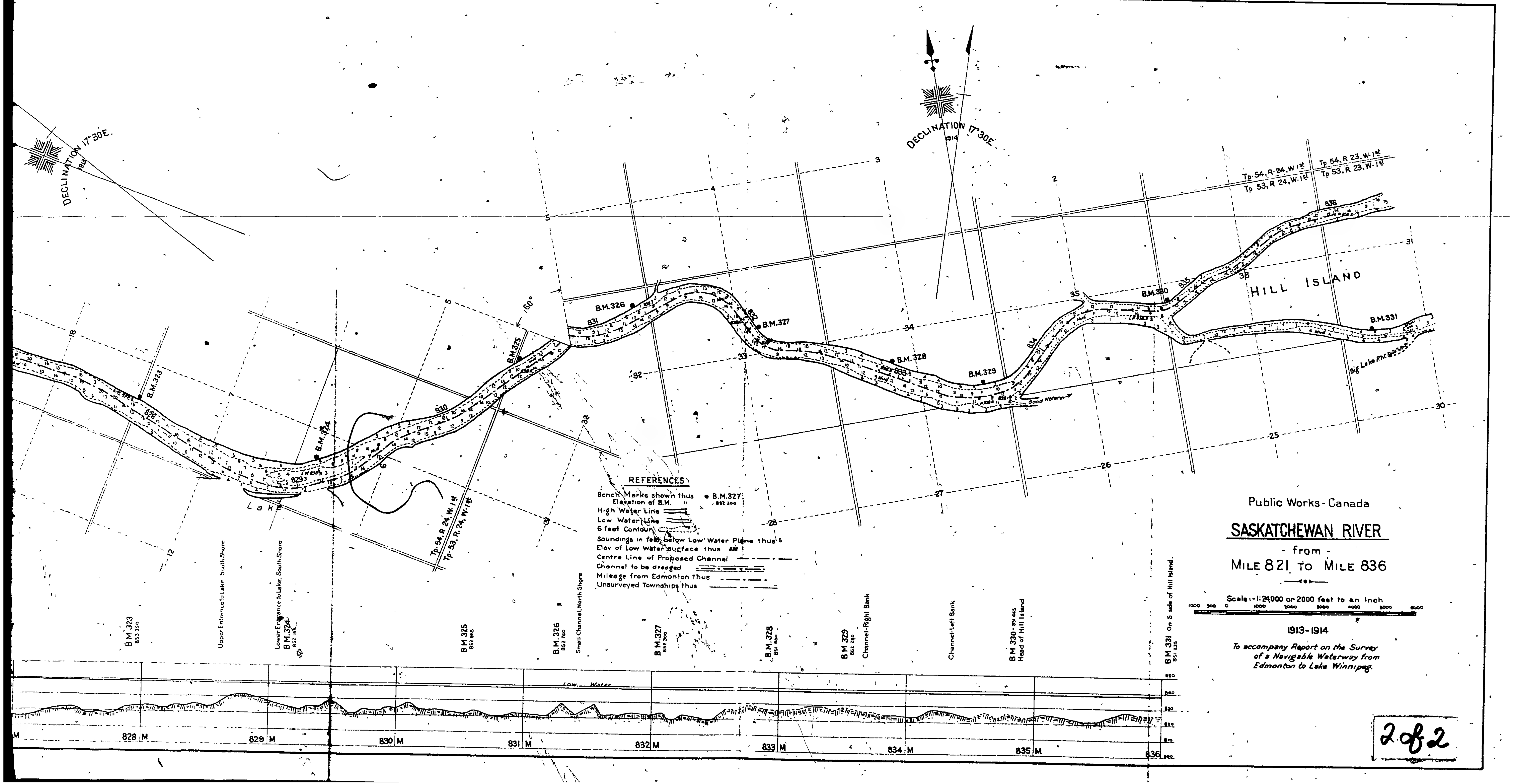
18
Tp 56, R. 26, W. 1st
Tp. 56, R. 25, W. 1st
Tp. 56, R. 25, W. 1st
Tp. 56, R. 24, W. 1st
Tp. 56, R. 25, W. 1st
Tp. 55, R. 25, W. 1st
B.M. 304
B.M. 305
B.M. 306
B.M. 307
B.M. 308
B.M. 309
B.M. 310
B.M. 311
B.M. 312
B.M. 313
Mud & Sand
Little River
Stony Shore
Mud
DECLINATION 17°30'E.
1913
REFERENCES
Bench Marks shown thus • B.M. 307
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet, Low Water Plane thus 5
Elev of Low Water Plane thus 844
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 807
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Little River Channel
Low Water
850
840
830
820
810
803
804 M
805 M
806 M
807 M
808 M
809 M
810 M
811 M
812 M
813 M
814 M

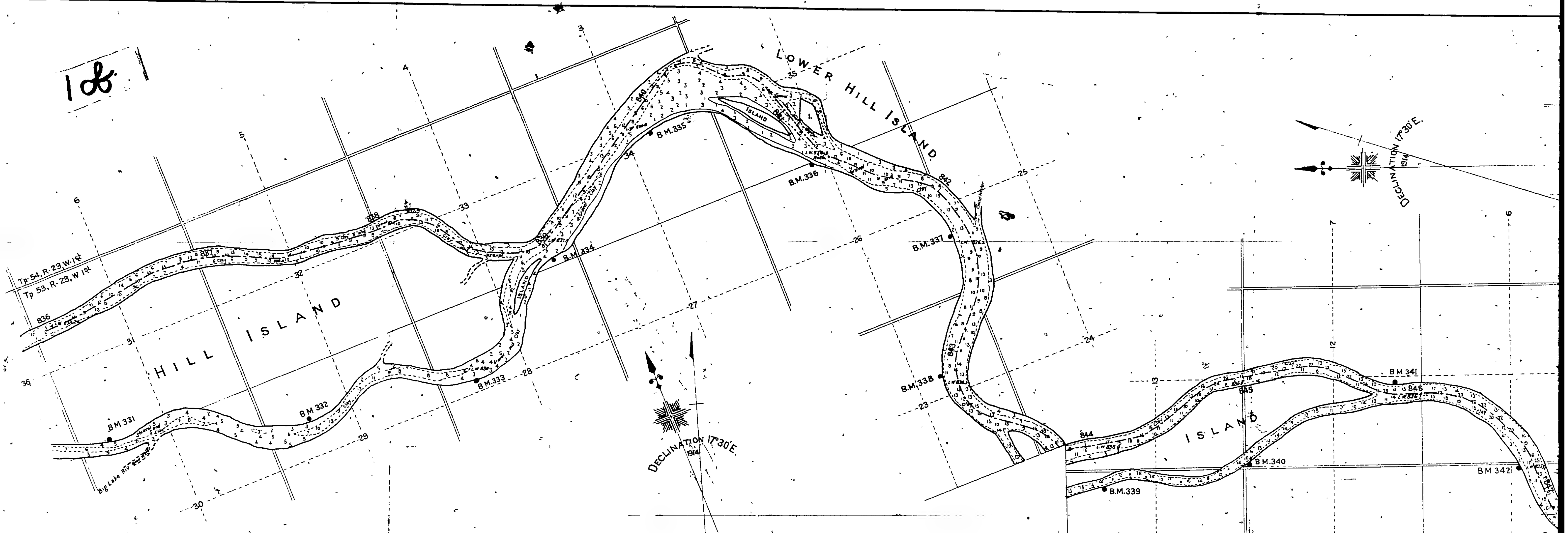

Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 803 TO MILE 821
Scale - 1:24,000 or 2000 feet to an Inch
1913
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
DECLINATION 17°30'E.
B.M. 308
B.M. 309
B.M. 310
B.M. 311
B.M. 312
B.M. 313
B.M. 314
B.M. 315
B.M. 316
B.M. 317
Tp. 56, R. 25, W. 1st
Tp. 56, R. 24, W. 1st
Tp. 55, R. 25, W. 1st
Tp. 55, R. 24, W. 1st
Moose Lake or Summerberry River
Swift Current
Mud
Gravel
Rocky
Head of Island
Mouth of Little Riv. Chan'l
Foot of Island
Low Water
Swift water
810 M
811 M
812 M
813 M
814 M
815 M
816 M
817 M
818 M
819 M
820 M
821

2 of 2



1b
Swift water
B.M. 318
822
B.M. 319
823
Tp. 54, R. 24, W. 1st
Tp. 54, R. 25, W. 1st
Tp. 55, R. 24, W. 1st
Tp. 55, R. 25, W. 1st
Ross Island
B.M. 320
B.M. 321
825
Lake
B.M. 322
827
B.M. 323
828
B.M. 324
829
Lake
830
B.M. 325
B.M. 326
831
60°
Declination 17° 30' E.
Tp. 54, R. 24, W. 1st
Tp. 53, R. 24, W. 1st
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
B.M. 318
Head Ross Island
B.M. 319
B.M. 320
Foot Ross Island
B.M. 321
Entrance to Lake - North Shore
B.M. 322
B.M. 323
Upper Entrance to Lake, South Shore
Lower Entrance to Lake, South Shore
B.M. 324
B.M. 325
B.M. 326
Small Channel, North Shore
Low Water
Low Water
850
840
830
820
810
800
821
822 M
823 M
824 M
825 M
826 M
827 M
828 M
829 M
830 M
831 M
Bench Ma
Elevat
High Wate
Low Wate
6 feet Cor
Soundings
Elev of Lo
Centre Li
Channel
Mileage f
Unsurveye


Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 821 TO MILE 836
Scale 1:24,000 or 2000 feet to an Inch
1913-1914
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B.M.327
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus
Unsurveyed Townships thus
DECLINATION 17°30'E.
HILL ISLAND
Tp 54, R 24, W 1st
Tp 53, R 24, W 1st
Tp 54, R 23, W 1st
Tp 53, R 23, W 1st
B.M.323
B.M.324
B.M.325
B.M.326
B.M.327
B.M.328
B.M.329
B.M.330
B.M.331
Lake
Good Water
Big Lake
Upper Entrance to Lake South Shore
Lower Entrance to Lake, South Shore
Small Channel, North Shore
Channel - Right Bank
Channel - Left Bank
B.M. 330 Head of Hill Island
B.M. 331 On S side of Hill Island
Low Water
828 M
829 M
830 M
831 M
832 M
833 M
834 M
835 M
836
2 of 2



PROFILE

ON CENTRE LINE OF CHANNEL

Scales { Half Mile to an Inch, Horizontal; 40 Feet " " " Vertical }

Datum assumed

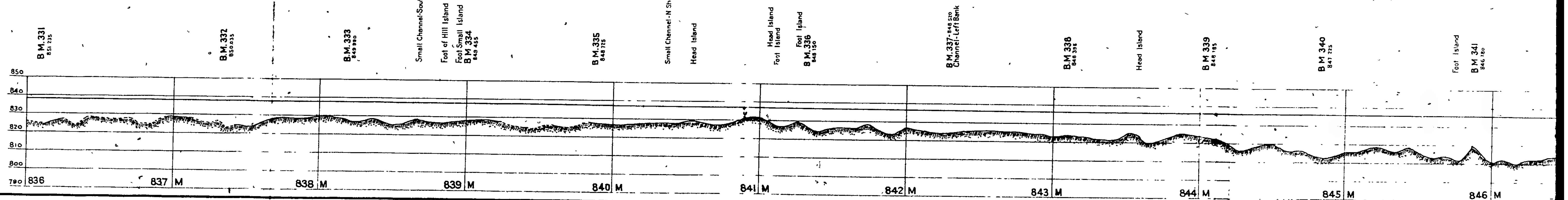
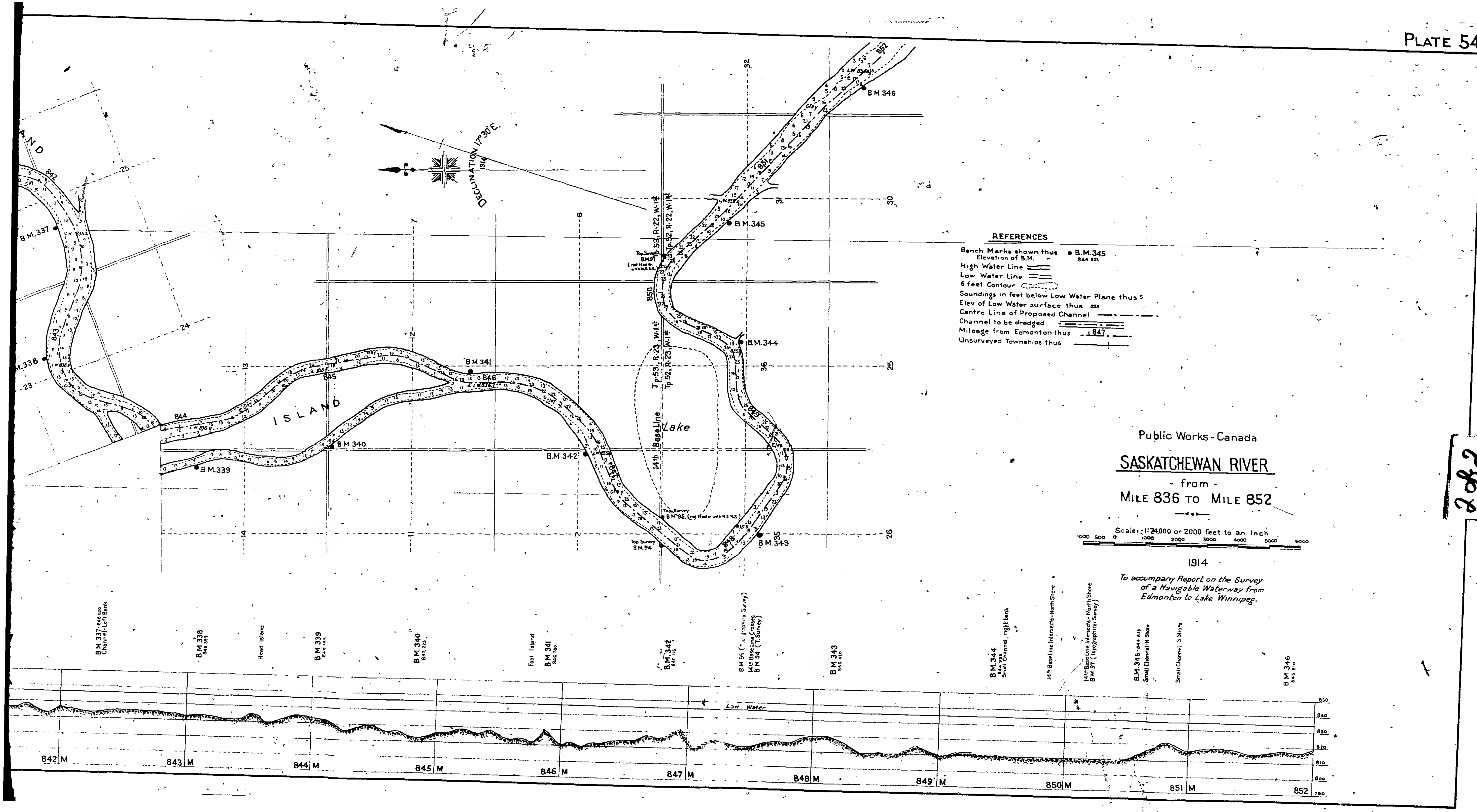
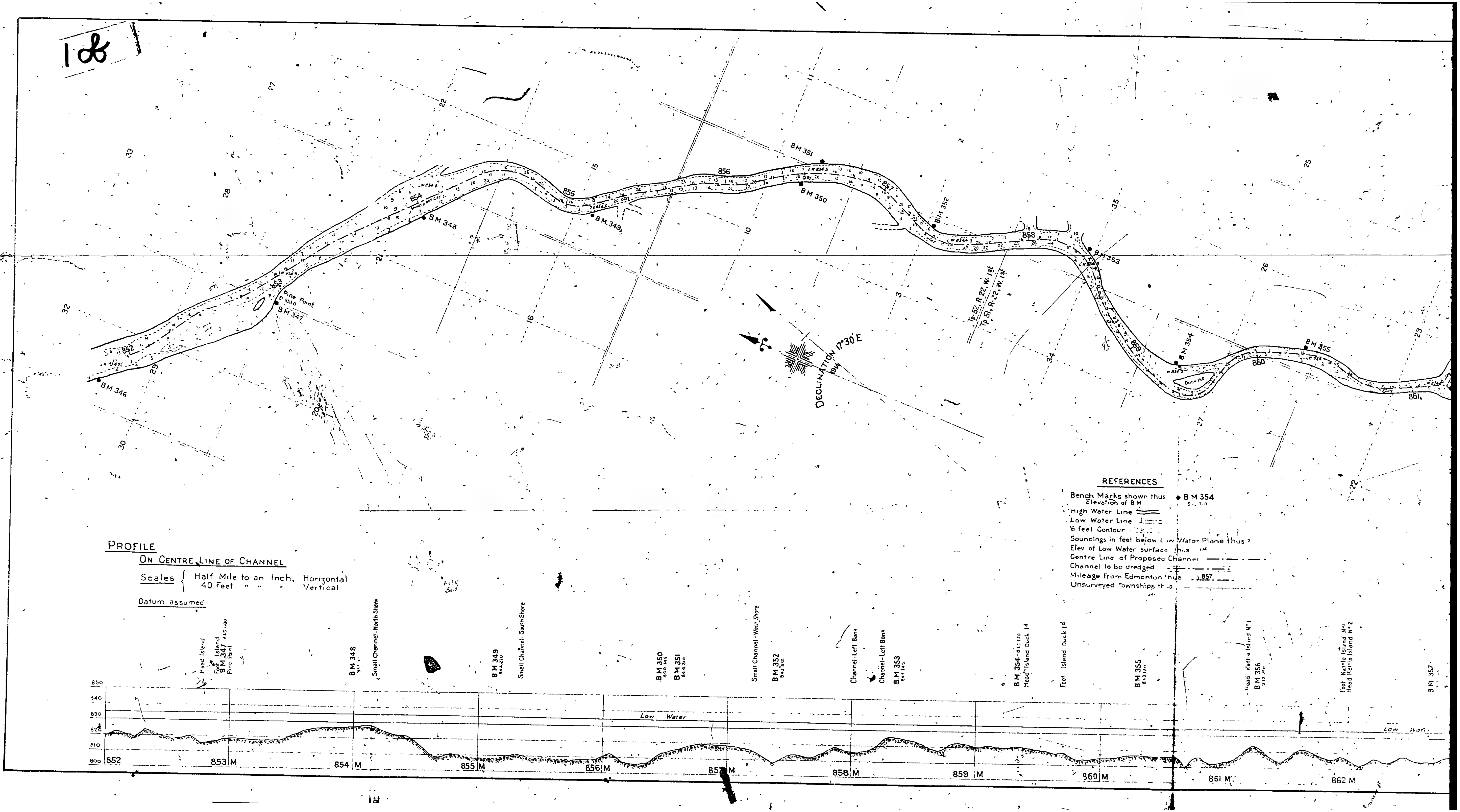
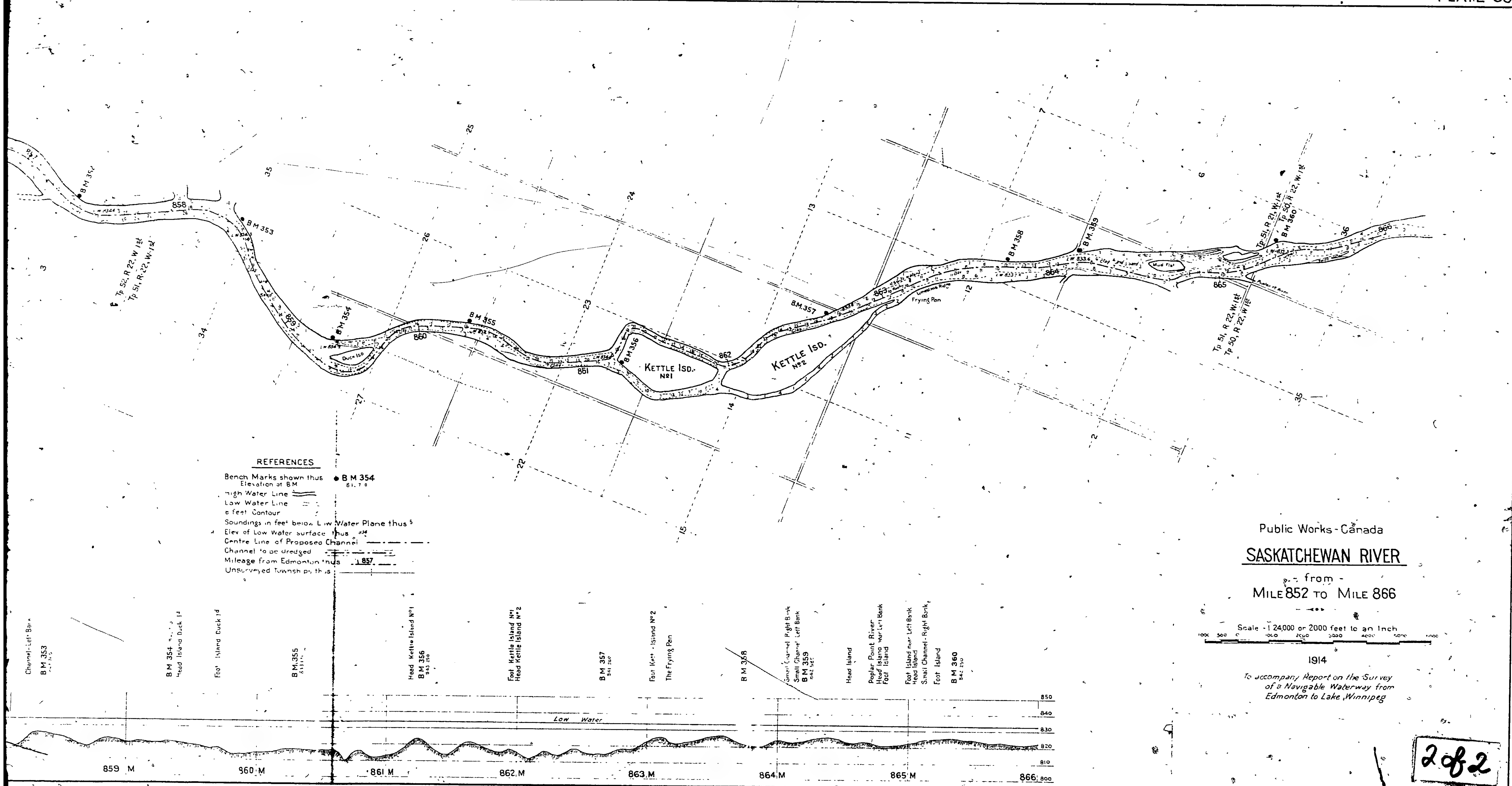


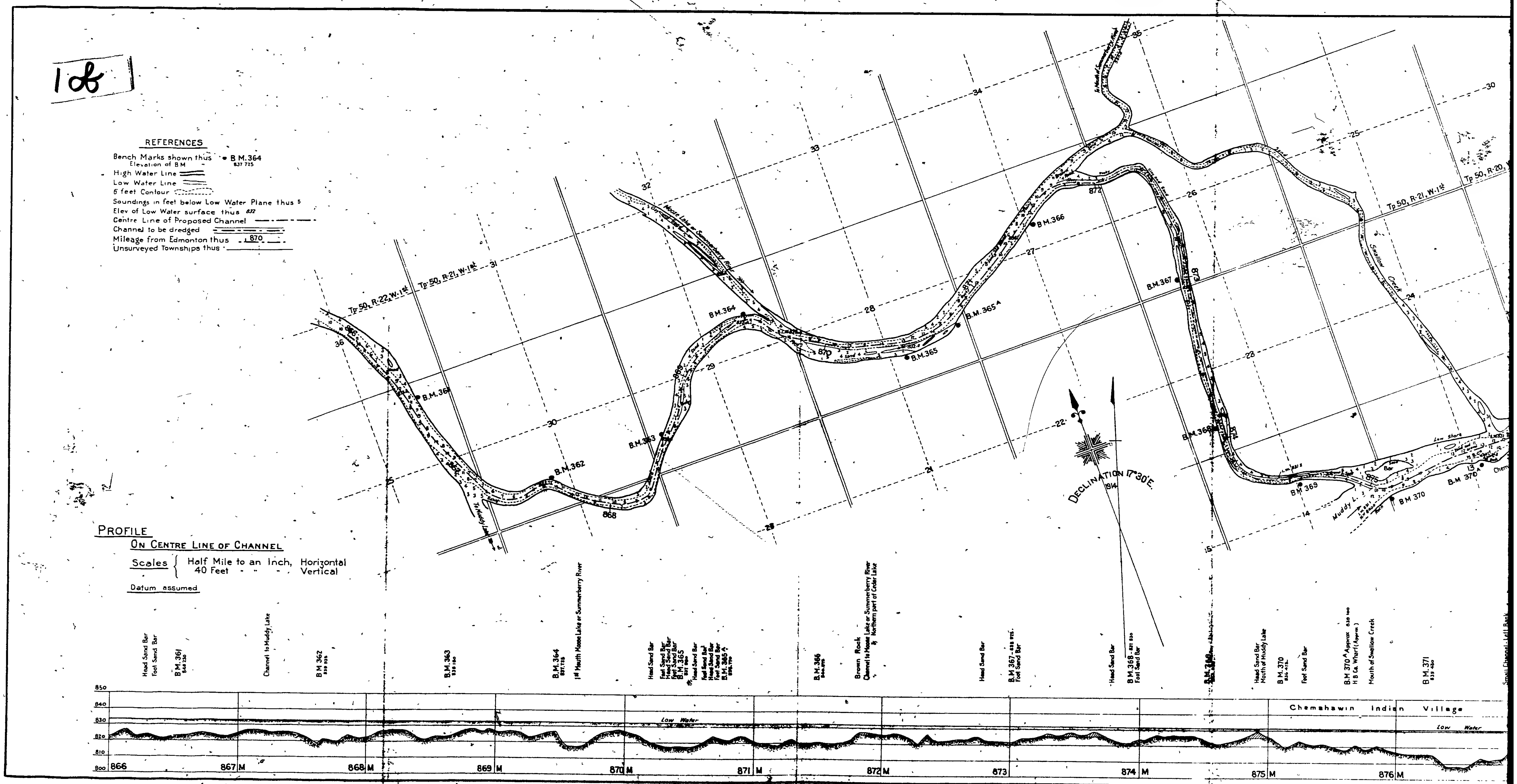
PLATE 54

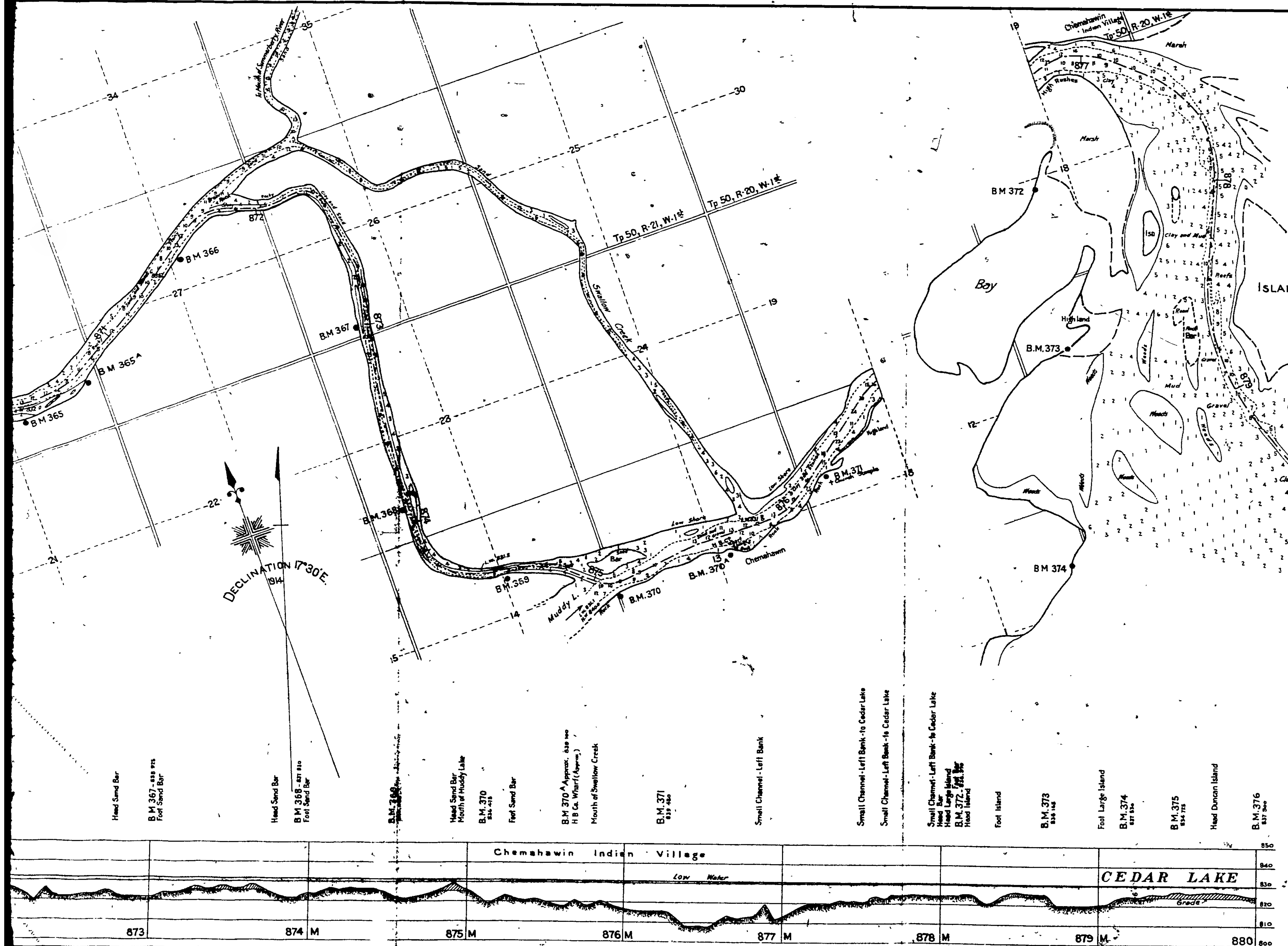

Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 836 TO MILE 852
Scale: 1:24,000 or 2000 feet to an Inch
1914
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg.
REFERENCES
Bench Marks shown thus • B.M. 345
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 847
Unsurveyed Townships thus
DECLINATION 17°30'E. 1914
ISLAND
Lake
14th Base Line
Tp 53, R 22, W 1st
Tp 52, R 22, W 1st
Tp 53, R 23, W 1st
Tp 52, R 23, W 1st
B.M. 337
B.M. 338
B.M. 339
B M 340
B M 341
B.M 342
B.M. 343
B.M. 344
B.M. 345
B M 346
Top Survey B.M. 94
Top Survey B.M. 95
Low Water
842 M
843 M
844 M
845 M
846 M
847 M
848 M
849 M
850 M
851 M
852
Head Island
Foot Island
Small Channel, right bank
14th Base Line Intersects - North Shore
Small Channel N Shore
Small Channel S Shore

282


18
BM 346
BM 347
Pine Point
BM 348
BM 349
BM 350
BM 351
BM 352
BM 353
BM 354
BM 355
852
853
854
855
856
857
858
859
860
861
DECLINATION 17°30 E
1914
Tp 52, R 22, W. 1st
Tp 51, R 22, W. 1st
Duck Isd
REFERENCES
Bench Marks shown thus • B M 354
Elevation of B M
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 857
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Head Island
Foot Island
B M 347
Pine Point
B M 348
Small Channel - North Shore
B M 349
Small Channel - South Shore
B M 350
B M 351
Small Channel - West Shore
B M 352
Channel - Left Bank
Channel - Left Bank
B M 353
B M 354
Head Island Duck Id
Foot Island Duck Id
B M 355
Head Kettle Island No 1
B M 356
Foot Kettle Island No 1
Head Kettle Island No 2
B M 357
Low Water
850
840
830
820
810
800
852
853 M
854 M
855 M
856 M
858 M
859 M
860 M
861 M
862 M


Public Works - Canada
SASKATCHEWAN RIVER
- from -
MILE 852 TO MILE 866
Scale - 1 24,000 or 2000 feet to an Inch
1914
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
REFERENCES
Bench Marks shown thus
Elevation of BM
High Water Line
Low Water Line
5 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 857
Unsurveyed Township thus
Kettle Isd. Nº1
Kettle Isd. Nº2
Duck Isd
Frying Pan
Mud Flat
Low Water
859 M
860 M
861 M
862 M
863 M
864 M
865 M
866
2 of 2


10b
REFERENCES
Bench Marks shown thus • B.M.364
Elevation of B.M. 837.725
High Water Line
Low Water Line
5 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 872
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 870
Unsurveyed Townships thus
Tp 50, R 22, W 1st
Tp 50, R 21, W 1st
Tp 50, R 20, W
Moose Lake or Summerberry River
Swallow Creek
To Muddy Lake
Muddy L.
DECLINATION 17°30'E. 1914
B.M.361
B.M.362
B.M.363
B.M.364
B.M.365
B.M.365A
B.M.366
B.M.367
B.M.368
B.M.369
B.M.370
868
870
872
873
874
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet - - - , Vertical
Datum assumed
Head Sand Bar
Foot Sand Bar
Channel to Muddy Lake
1st Mouth Moose Lake or Summerberry River
Brown Rock
Channel to Moose Lake or Summerberry River & Northern part of Cedar Lake
Mouth of Muddy Lake
B.M.370A Approx.
H.B.Co. Wharf (Approx.)
Mouth of Swallow Creek
B.M.371
Chemahawin Indian Village
Low Water
850
840
830
820
810
800
866
867 M
868 M
869 M
870 M
871 M
872 M
873
874 M
875 M
876 M



Public Works - Canada

SASKATCHEWAN RIVER

- from -

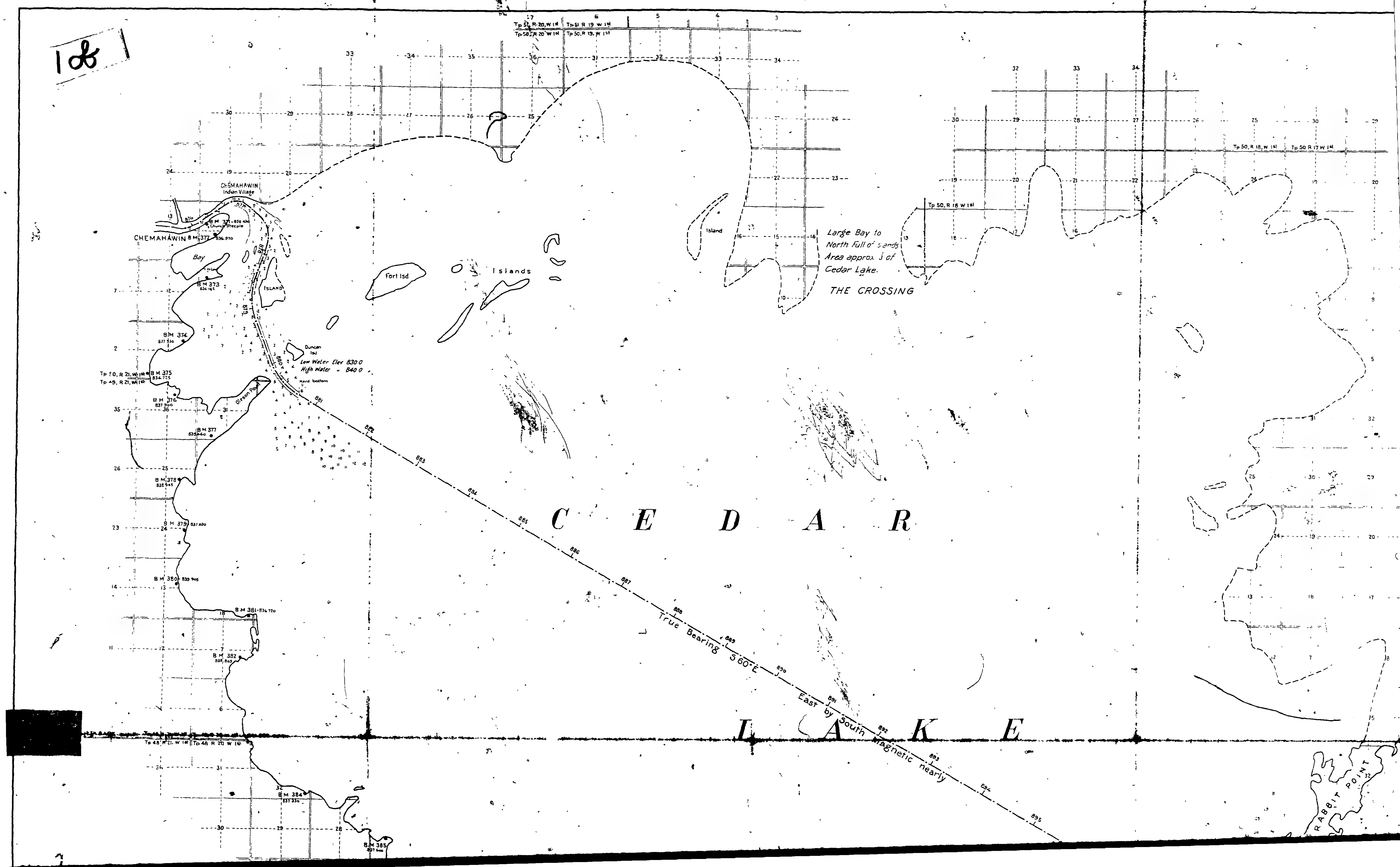
MILE 866 TO MILE 880

Scale - 1:24,000 or 2000 feet to an Inch

1914

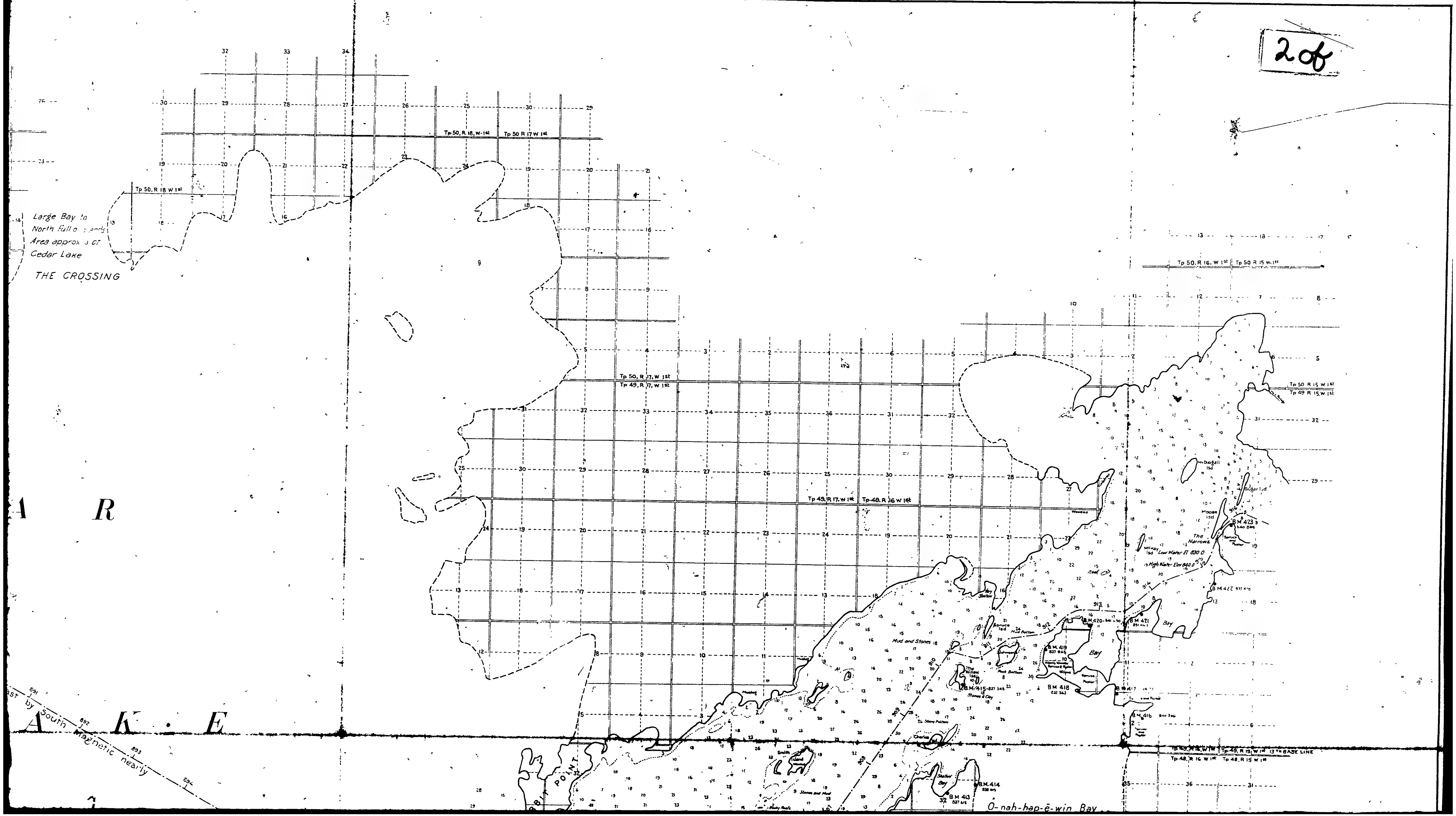
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg

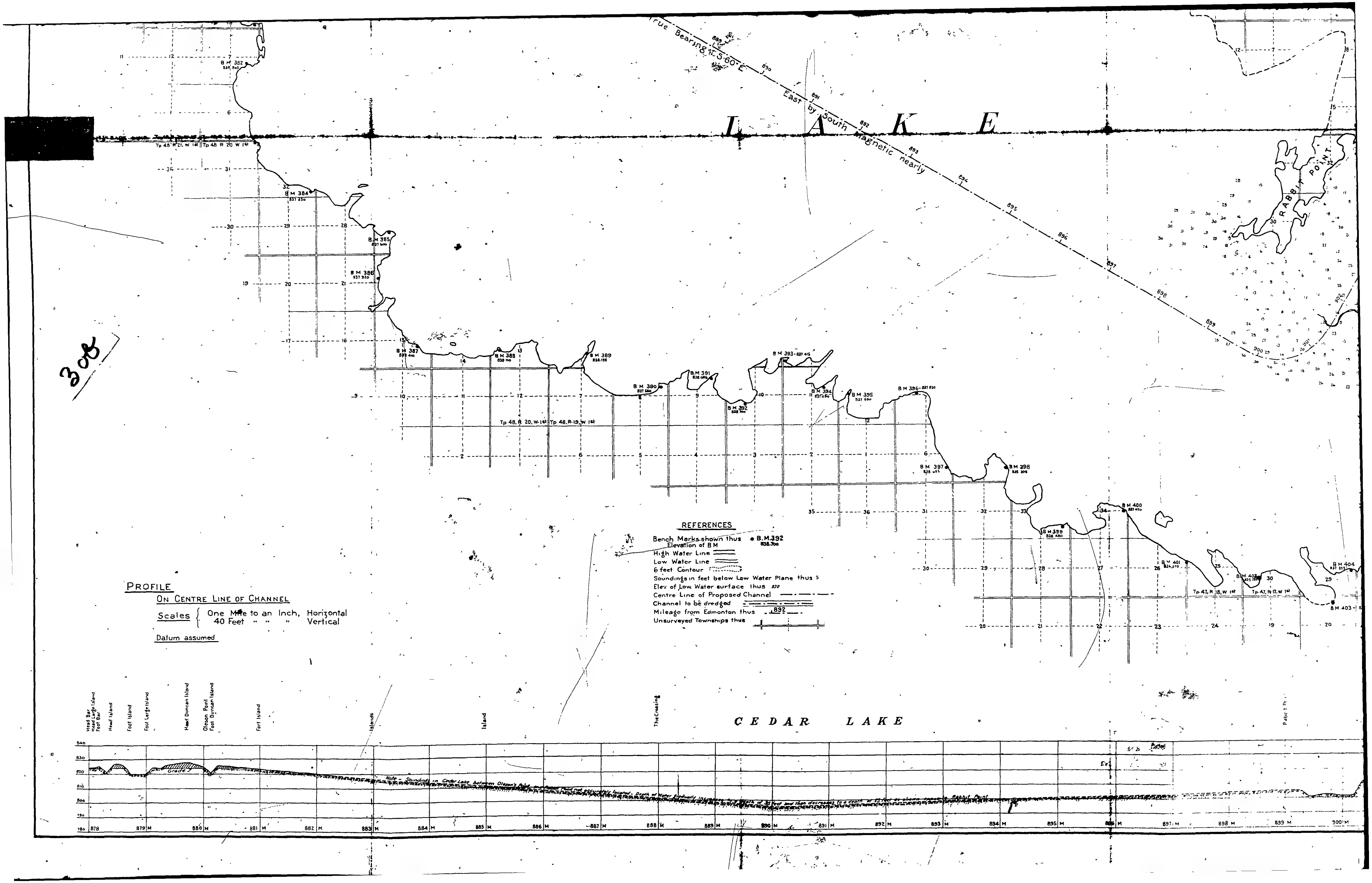
2 of 2

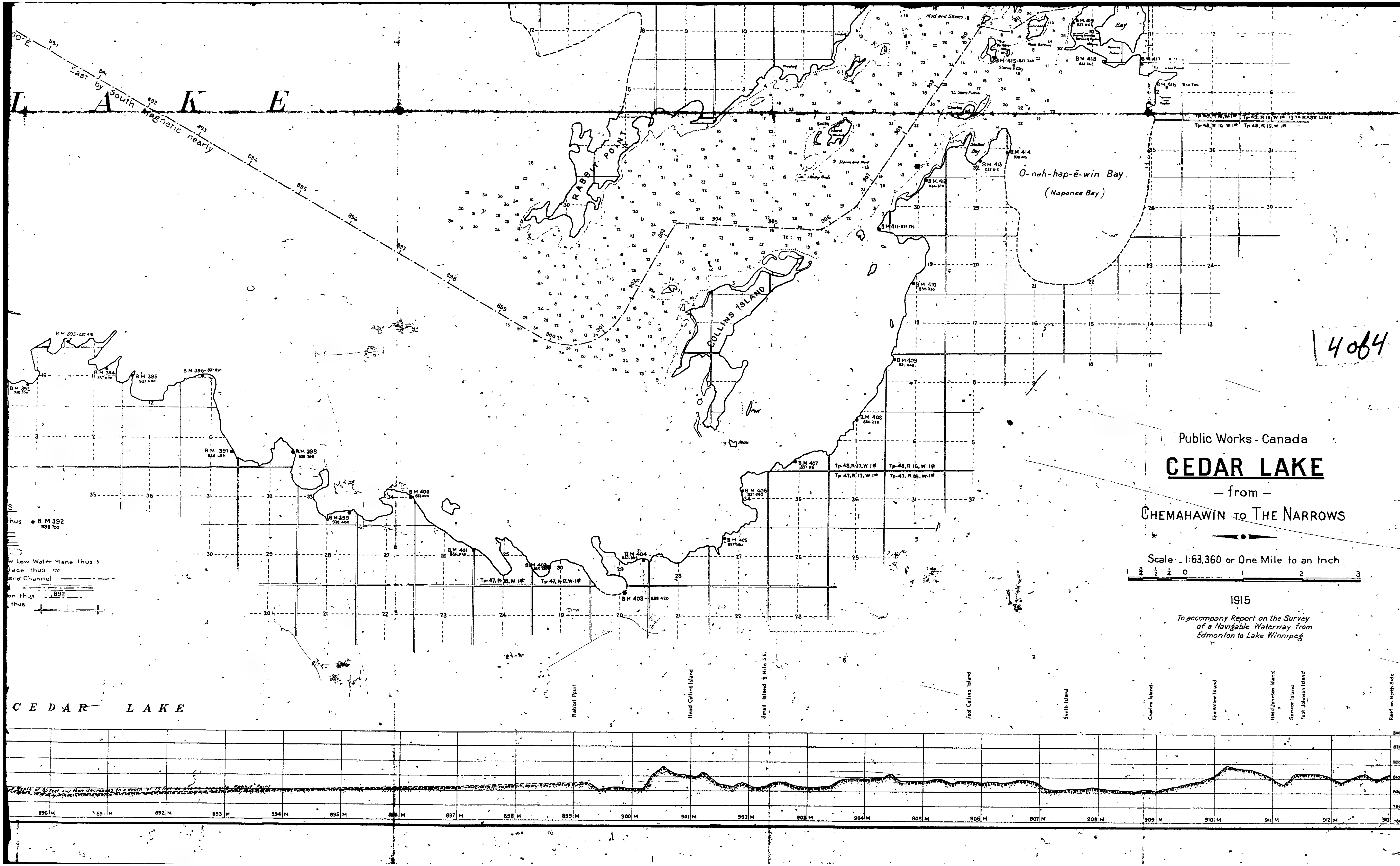


18
CHEMAHAWIN Indian Village
CHEMAHAWIN
Church Steeple
Bay
Island
Fort Isd
Islands
Duncan Isd
Low Water Elev 830.0
High Water " 840.0
Hard bottom
Olsen Point
Island
Large Bay to North Full of sands Area approx 1/3 of Cedar Lake.
THE CROSSING
C E D A R
L A K E
True Bearing S 60° E
East by South magnetic nearly
RABBIT POINT
Tp 51, R 20, W 1st
Tp 51, R 19, W 1st
Tp 50, R 20, W 1st
Tp 50, R 19, W 1st
Tp 50, R 18, W 1st
Tp 50, R 17 W 1st
Tp 50, R 21, W 1st
Tp 49, R 21, W 1st
Tp 48, R 21, W 1st
Tp 48, R 20, W 1st
B M 377
B M 373
B M 374
B M 375
B M 376
B M 377
B M 378
B M 379
B M 380
B M 381
B M 382
B M 384
B M 385

2 of


Large Bay to
North full of ...
Area approx. of
Cedar Lake
THE CROSSING
Tp 50, R 18 W 1st
Tp 50, R 18, W 1st
Tp 50 R 17 W 1st
Tp 50, R 17, W 1st
Tp 49, R 17, W 1st
Tp 49, R 17, W 1st
Tp 48, R 16 W 1st
Tp 50, R 16, W 1st
Tp 50 R 15 W 1st
Tp 49 R 15 W 1st
Tp 49, R 15, W 1st
13TH BASE LINE
Tp 48, R 16 W 1st
Tp 48, R 15 W 1st
A R
A K E
by South Magnetic nearly
Mud and Stones
Rock Bottom
Stones & Clay
Stones and Mud
Smith Island
The Narrows
Low Water El 830.0
High Water Elev 842.0
Moose Isd
Sugar Isd
Bay
Bay
Bay
B.M. 413
B.M. 414
B.M. 415
B.M. 416
B.M. 417
B.M. 418
B.M. 419
B.M. 420
B.M. 421
B.M. 422
B.M. 423
O-nah-hap-ē-win Bay

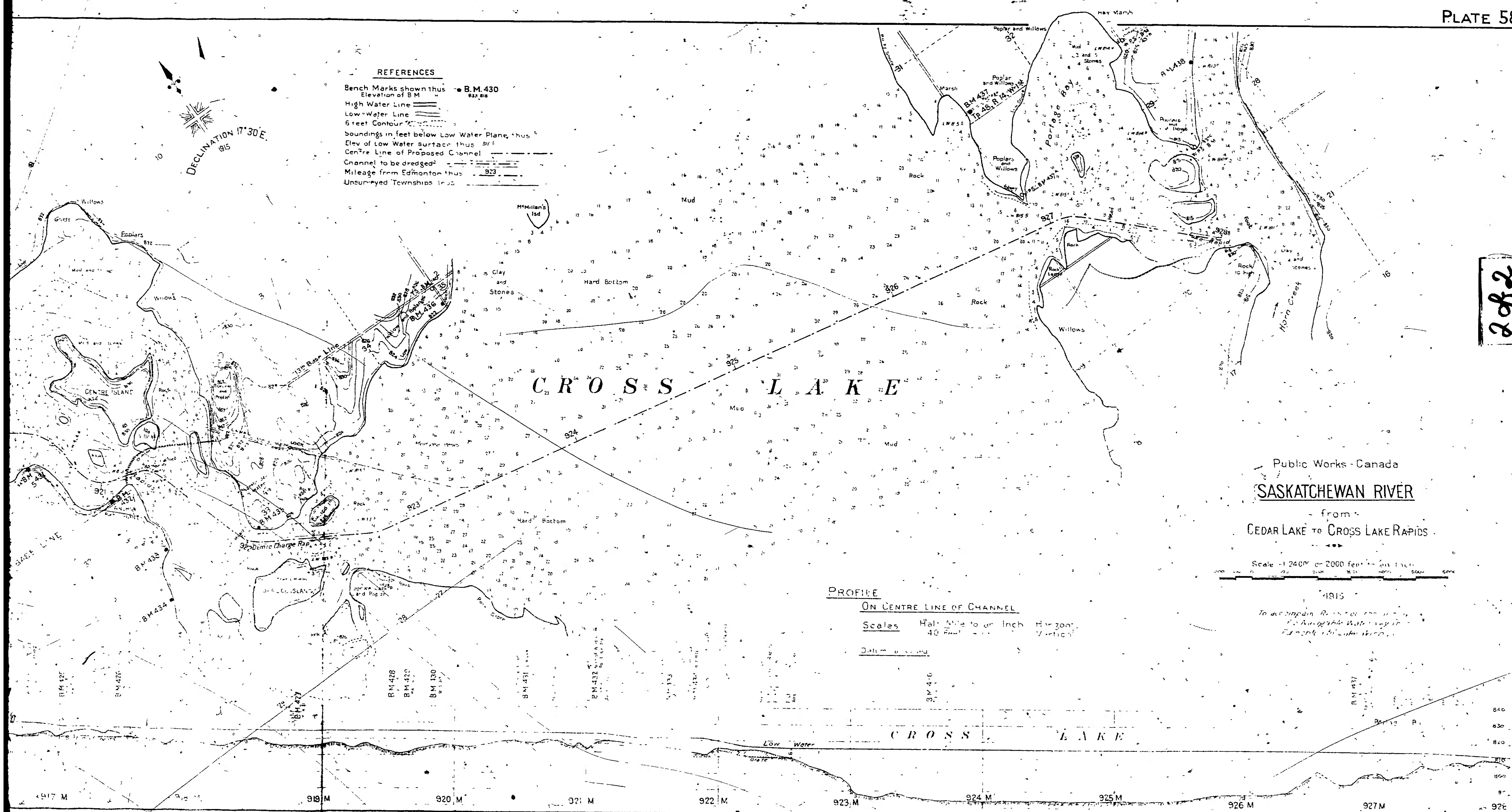

LAKE
True Bearing S 73°60' E
East by South Magnetic nearly
RABBIT POINT
Tp 48 R 21 W 1st
Tp 48 R 20 W 1st
Tp 48 R 20 W 1st
Tp 48 R 19 W 1st
Tp 47 R 18 W 1st
Tp 47 R 17 W 1st
B M 382
B M 384
B M 385
B M 386
B M 387
B M 388
B M 389
B M 390
B M 391
B M 392
B M 393
B M 394
B M 395
B M 396
B M 397
B M 398
B M 399
B M 400
B M 401
B M 402
B M 403
B M 404
308
REFERENCES
Bench Marks shown thus • B.M.392
Elevation of B M 838.700
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus 5
Elev of Low Water surface thus 830
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 892
Unsurveyed Townships thus
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { One Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
Head Bar
Head Large Island
Foot Bar
Head Island
Foot Island
Foot Large Island
Head Duncan Island
Oleson Point
Foot Duncan Island
Fort Island
Islands
Island
The Crossing
Rabbit Pt
CEDAR LAKE
Grade
878
879 M
880 M
881 M
882 M
883 M
884 M
885 M
886 M
887 M
888 M
889 M
890 M
891 M
892 M
893 M
894 M
895 M
896 M
897 M
898 M
899 M
900 M



Public Works - Canada
CEDAR LAKE
— from —
CHEMAHAWIN TO THE NARROWS
Scale - 1:63,360 or One Mile to an Inch
1915
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
4064
LAKE
CEDAR LAKE
East by South Magnetic nearly
RABBIT POINT
COLLINS ISLAND
O-nah-hap-ē-win Bay
(Napanee Bay)
Smith Island
Mud and Stones
Rabbit Point
Head Collins Island
Foot Collins Island
Smith Island
Charles Island
The Willow Island
Head Johnson Island
Spruce Island
Foot Johnson Island
Reef on North Side
B M 392
B M 393
B M 394
B M 395
B M 396
B M 397
B M 398
B M 399
B M 400
B M 401
B M 402
B M 403
B M 404
B M 405
B M 406
B M 407
B M 408
B M 409
B M 410
B M 411
B M 412
B M 413
B M 414
B M 415
B M 416
B M 417
B M 418
B M 419
Tp-48, R 17, W 1st
Tp-48, R 16, W 1st
Tp-47, R 17, W 1st
Tp-47, R 16, W 1st
Tp-47, R 18, W 1st
Tp 49, R 15, W 1st
Tp-48, R 16 W 1st
Tp 48, R 15, W 1st
Low Water Plane thus
890 M
891 M
892 M
893 M
894 M
895 M
896 M
897 M
898 M
899 M
900 M
901 M
902 M
903 M
904 M
905 M
906 M
907 M
908 M
909 M
910 M
911 M
912 M
913 M

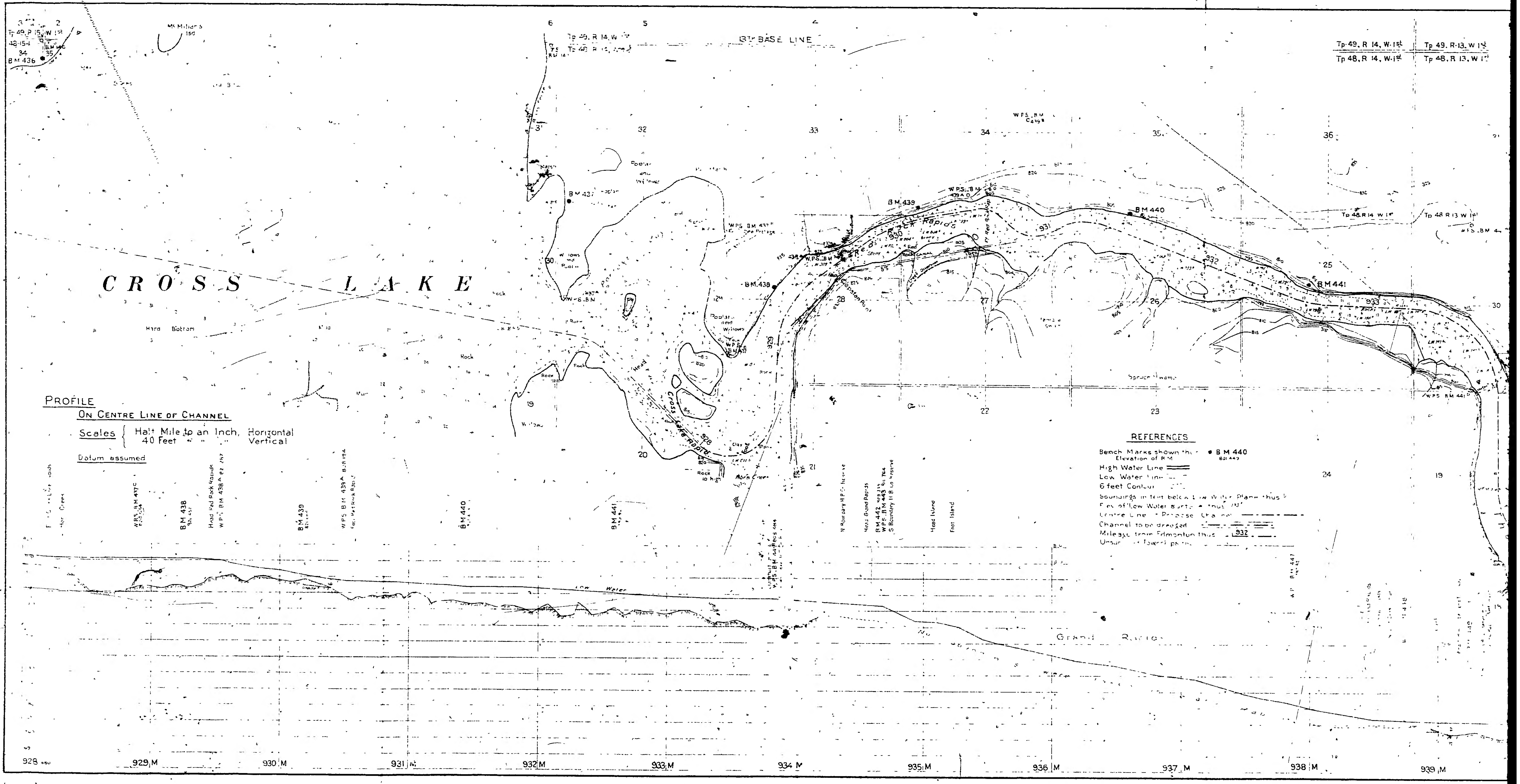
108

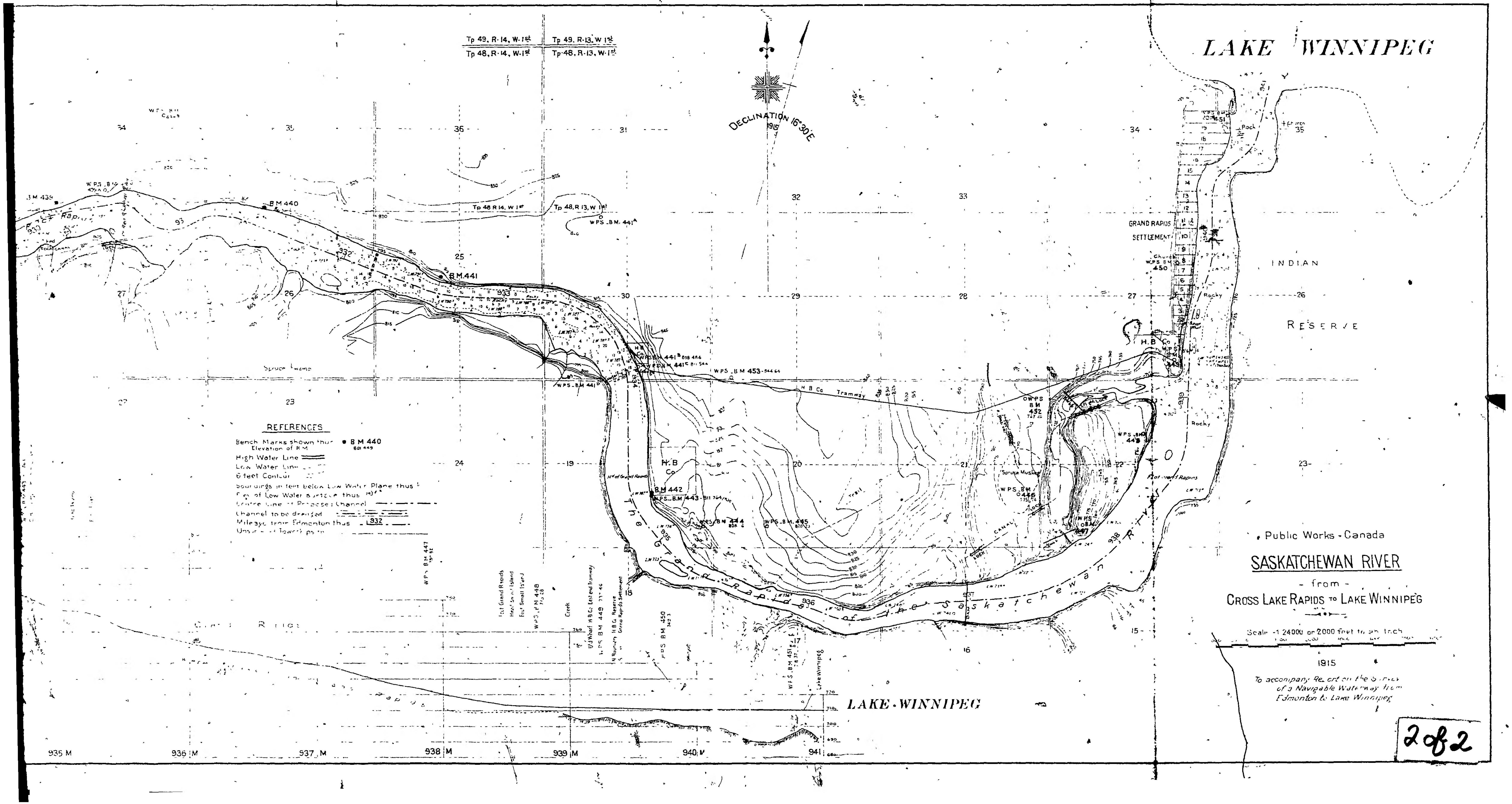

REFERENCES
Bench Marks shown thus
Elevation of B.M.
B.M. 430
High Water Line
Low Water Line
Contour
Soundings in feet below Low Water Plane
Elev. of Low Water surface
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton
Unsurveyed Townships
DECLINATION 17°30'E.
1915
CEDAR LAKE
CRO
McDOUGALL ISD
McKAY ISD
MOOSE ISD
Sugar Isd
DIVIDING ISD.
CENTRE ISLAND
SPRUCE ISLAND
McMillans Isd
Small Lake
The Narrows
Portage
Bay
Mud and Stones
Rocky Shoals
Spruce and Poplar
Rock
Willows
Poplar
Marsh
ANCHOR POINT
Demi-Charge Rap.
13th BASE LINE
13th Base Line
Lock
Tp. 49, R. 16 W. 1st
B.M. 410
B.M. 419
B.M. 420
B.M. 421
B.M. 422
B.M. 423
B.M. 424
B.M. 425
B.M. 426
B.M. 427
B.M. 428
B.M. 429
B.M. 430
B.M. 433
B.M. 434
B.M. 435
B.M. 436
Low Water
911
912 M
913 M
914 M
915 M
916 M
917 M
918 M
919 M
920 M



2 of 2

poor copy


CROSS LAKE
13th BASE LINE
Tp 49. R 14. W 1st
Tp 49. R 13. W 1st
Tp 48. R 14. W 1st
Tp 48. R 13. W 1st
BM 436
BM 437
BM 438
BM 439
BM 440
BM 441
Hard Bottom
Rock
Poplar and Willows
Willows and Poplars
Spruce Swamp
Cross Lake Rapids
Red Rock Rapids
PROFILE
ON CENTRE LINE OF CHANNEL
Scales { Half Mile to an Inch, Horizontal
40 Feet " " " Vertical
Datum assumed
REFERENCES
Bench Marks shown thus • B M 440
Elevation of B.M.
High Water Line
Low Water Line
6 feet Contour
Soundings in feet below Low Water Plane thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 932
Low Water
Grand Rapids
928
929 M
930 M
931 M
932 M
933 M
934 M
935 M
936 M
937 M
938 M
939 M


LAKE WINNIPEG
DECLINATION 16°30'E 1915
Tp 49, R.14, W.1st
Tp 49, R.13, W.1st
Tp 48, R.14, W.1st
Tp 48, R.13, W.1st
GRAND RAPIDS SETTLEMENT
INDIAN RESERVE
BM 440
BM 441
BM 442
The Grand Rapids of the Saskatchewan River
H.B Co Tramway
Spruce Swamp
Spruce Muskeg
CANAL
LAKE WINNIPEG
REFERENCES
Bench Marks shown thus • BM 440
Elevation of B.M.
High Water Line
Low Water Line
5 feet Contour
Soundings in feet below Low Water Plane thus
Elev. of Low Water surface thus
Centre Line of Proposed Channel
Channel to be dredged
Mileage from Edmonton thus 932
935 M
936 M
937 M
938 M
939 M
940 M
941
Public Works - Canada
SASKATCHEWAN RIVER
- from -
CROSS LAKE RAPIDS TO LAKE WINNIPEG
Scale 1:24000 or 2000 feet to an Inch
1915
To accompany Report on the Survey of a Navigable Waterway from Edmonton to Lake Winnipeg
2 of 2